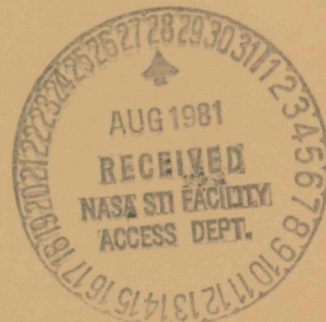




Aerospace Medicine
and Biology
A Continuing
Bibliography
with Indexes

NASA SP-7011 (221)
July 1981

National Aeronautics and
Space Administration



(NASA-SP-7011(221)) AEROSPACE MEDICINE AND
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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 221)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in June 1981 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



NASA SP-7011 and its supplements are available from the National Technical Information Service (NTIS). Questions on the availability of the predecessor publications, Aerospace Medicine and Biology (Volumes I - XI) should be directed to NTIS.

INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 127 reports, articles and other documents announced during June 1981 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1981 Supplements.

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All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies of accessions are available at \$7.00 per document up to a maximum of 40 pages. The charge for each additional page is \$0.25. Microfiche⁽¹⁾ of documents announced in *IAA* are available at the rate of \$3.00 per microfiche on demand, and at the rate of \$1.25 per microfiche for standing orders for all *IAA* microfiche. The price for the *IAA* microfiche by category is available at the rate of \$1.50 per microfiche plus a \$1.00 service charge per category per issue. Microfiche of all the current AIAA Meeting Papers are available on a standing order basis at the rate of \$1.50 per microfiche.

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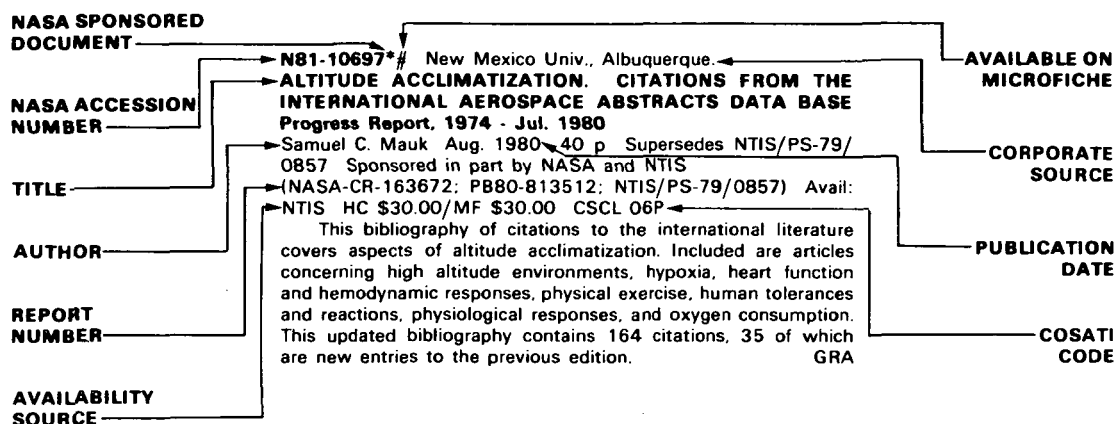
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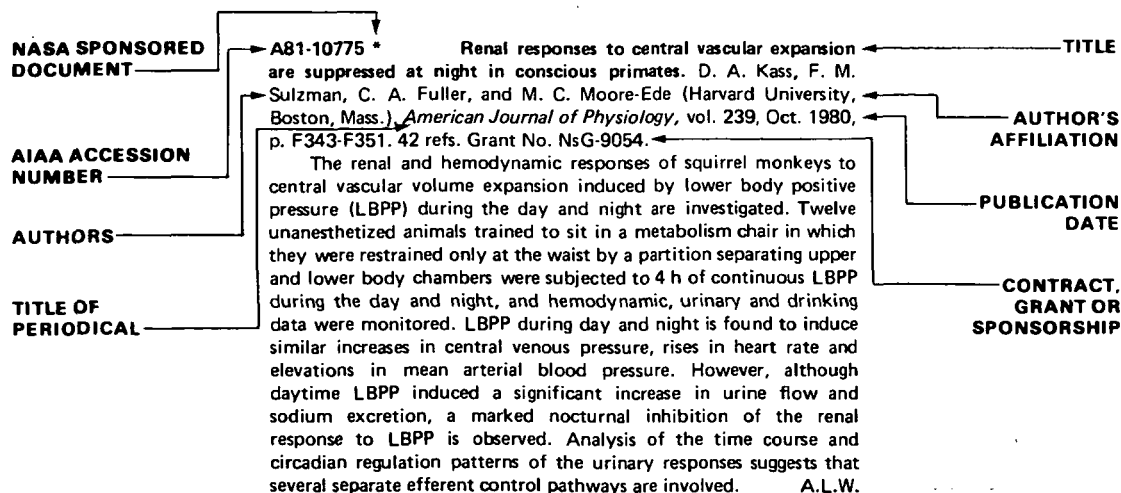
TABLE OF CONTENTS

	Page
IAA ENTRIES (A81-10000)	103
STAR ENTRIES (N81-10000)	109
Subject Index	I-1
Personal Author Index	I-17

TYPICAL CITATION AND ABSTRACT FROM STAR



TYPICAL CITATION AND ABSTRACT FROM IAA



AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 221)

JULY 1981

IAA ENTRIES

A81-27396 # Permissible rates of barometric pressure changes (O dopustimyykh velichinakh skorosti izmeneniia barometri-cheskogo davleniia). E. V. Lapaev, G. I. Tarasenko, and V. N. Chernukha. *Voenno-Meditsinskii Zhurnal*, Jan. 1981, p. 50-52. 6 refs. In Russian.

Human reactions to rates of change of barometric pressure corresponding to those encountered in the flight environment are investigated in order to determine tolerance limits. EKG, respiratory, middle ear, auditory and subjective responses were monitored in 15 normal subjects exposed to pressures corresponding to simulated altitudes of 4000-500 m which changed repeatedly at rates up to 9.2 mm Hg/sec. It is found that pressure changes at the upper limit lead to reactions including acute hyperemia of the posterosuperior and superior tympanic membranes and the skin of the external auditory meatus, temporary decreases in auditory sensitivity, pulse variations, breathing abnormalities and unpleasant sensations in the ears during the compressive phases, which however, are observed with a marked decrease in severity at rates of 8.8 mm Hg/sec. It is thus concluded that the rates of repeated pressure variations undergone by flight crews should not exceed 8.8 mm Hg/sec. A.L.W.

A81-27397 # Preventing body mass elevation in aviators (K profilaktike povysheniia massy tela u letchikov). M. P. Vavilov and D. Iu. Udalov. *Voenno-Meditsinskii Zhurnal*, Jan. 1981, p. 53-55. In Russian.

Results are presented of a study of the phenomenon of overweight in aviators, and possible means of its prevention are considered. A statistical study of pilots flying the same type of aircraft and receiving regular rations or eating at home and in public cafeterias and persons with ground-based duties reveals the aviators to have a greater tendency to excess body weight than non-flying personnel, with some exhibiting alimentary obesity. Overweight in aviators was also found to be correlated with accumulated flight time, age, and the stress levels encountered in flight duties. The state of lipid exchange and the generation of excess body mass in aviators are shown to depend on a variety of factors, including job stress levels, food choices and vitamin intake, which must be taken into account in the planning and performance of prophylactic measures, which may include the rationalization of eating patterns, vitamin supplements and increases in motor activity. A.L.W.

A81-27533 # Control of walking machines (Upravlenie shagaiushchimi apparatami). V. B. Larin. Kiev, Izdatel'stvo Naukova Dumka, 1980. 168 p. 78 refs. In Russian.

Mathematical models of the dynamics and control of biped and quadruped walking machines are considered. The dynamics of the walking machine is described either by differential equations or by finite-difference equations for different phases of motion. The control problem is solved in the framework of linear quadratic Gaussian theory. Attention is given to the implementation of digital computers in the control loops and to the feasibility of minimizing energy consumption in the operation of walking machines. B.J.

A81-27537 # The design of cosmonaut living and working conditions (Proektirovanie uslovii zhizni i raboty kosmonavtov). N. N. Gurovskii, F. P. Kosmolinskii, and L. N. Mel'nikov. Moscow, Izdatel'stvo Mashinostroenie, 1980. 168 p. 34 refs. In Russian.

The book discusses the design and arrangement of spacecraft cabin interiors and equipment for the optimization of crew living and working conditions. Spacecraft design is considered in relation to cosmonaut work activities, and the influence of cabin interior factors on cosmonaut activity during prolonged flights is discussed. The spacecraft is examined as a human habitat, and means for the improvement of cosmonaut work effectiveness are considered. The application of the methods of industrial esthetics to the organization of spacecraft cabin interiors is then discussed, and consideration is given to the diurnal rhythms, the roles of light and music, and leisure activities in space. A.L.W.

A81-27573 # Visual illusions arising during the perception of moving images (O zritel'nykh illiuziakh, voznikaushchikh pri vospriatii dvizhushchikhsia izobrazhenii). N. F. Podvigin and Iu. E. Shelepin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 67, Feb. 1981, p. 223-227. 17 refs. In Russian.

The perception of visual images with velocities and spatial frequencies near the limits of the visual operational range is investigated. Experiments were performed to determine the angular velocities at which the edges of images of gratings projected on a screen at which subjects fixed their gaze began to defocus or blur for gratings of different spatial frequencies. Two types of visual illusion are observed: the illusion of the defocusing of the leading edge of a rectangular band of the moving grating and the illusion of the rubbing out of the leading, high-frequency portion of a moving grating of variable spatial frequency. The image velocity at which the illusions are first apparent is found to depend hyperbolically on the spatial frequency of the test grating. Neurophysiological mechanisms of the illusions are discussed in terms of receptive field reorganization time. A.L.W.

A81-27574 # The role of thyroid hormones in thermoregulatory reactions during altitude adaptation (O roli gormonov shchitovidnoi zhelezy v reaktsiakh termoregulatsii pri adaptatsii k vysokogor'iu). Iu. I. Bazhenov and B. K. Sydykov (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii

Vysokogor'ia, Frunze, Kirgiz SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 67, Feb. 1981, p. 294-298. 21 refs. In Russian.

The influence of thyroid hormones on thermogenesis at various stages of altitude adaptation is investigated. Oxygen demand, muscle electrical activity and body temperatures were monitored in white rats at ambient temperatures of 22-24 C and 4-6 C during adaptation to an altitude of 3200 m in control animals and in rats injected daily with triiodothyronine or an antithyroidal preparation of thiamazole. Adaptation to altitude hypoxia is found to decrease the metabolic reactions of the control rats to cold. Injections of thiamazole are observed to lead to a decrease in transport processes and heat production, thus adding to the effects of hypoxia and decreasing the thermal stability of the organism. Triiodothyronine, on the other hand, is observed to increase transport levels and body temperatures and reverse the effects of hypoxia. It is thus proposed that a decrease in the functional capability of the thyroid may be partly responsible for the decrease in the effects of cold on muscular contractions observed during adaptation to hypoxia. A.L.W.

A81-27575 # Relic processes in the rat circulatory system during long-term adaptation to hypoxia (Sledovye protsessy v sisteme krovoobrashcheniia u krys pri dolgovremennoi adaptatsii k gipoksii). N. K. Khitrov, A. M. Alavardian, A. B. Toloknov, and E. B. Tezikov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 67, Feb. 1981, p. 325-329. 8 refs. In Russian.

A81-27890 Some university experiences of aircraft simulator research. A. Q. Chapleo (Belfast, Queen's University, Belfast, Northern Ireland). (*Royal Aeronautical Society, Symposium on 'Is Flight Simulation of Academic Interest', London, England, Nov. 22, 1979.*) *Aeronautical Journal*, vol. 84, Aug. 1980, p. 223-226.

An historical overview is given of the series of aircraft-control simulation devices constructed and development programs undertaken at the Queen's University of Belfast since the early 1960's. The flight simulation studies covered include an investigation of piloting problems using analog techniques (1963), the manual control of jet lift aircraft in hovering flight (1966), manual control of a dynamic VTOL simulator (1968), quantitative investigation of aircraft simulator pitch motion laws (1973), quantitative investigation of the effects of motion on an aircraft roll simulator (1977), and the effect of visual information on the pilot's ability to land an aircraft (1977).

O.C.

A81-27891 Behavioural evaluations of simulators - Academic and practical issues. R. B. Stammers (Aston, University, Birmingham, England). (*Royal Aeronautical Society, Symposium on 'Is Flight Simulation of Academic Interest', London, England, Nov. 22, 1979.*) *Aeronautical Journal*, vol. 84, Aug. 1980, p. 227-229. 6 refs. Social Science Research Council Grant No. HR-5326.

A consideration of training simulators from the point of view of psychology is presented, with stress on the range of disciplines and interests that may be involved in the design, use and evaluation of training simulators. Two areas of development that are isolated and recommended for future consideration are the refinement of simulator principles and the complementary evolution of alternative, simulator-less training systems that utilize advances in computer graphics for task representation. O.C.

A81-28116 Change in the biomechanical properties in the bone of rats as a result of a 19-day space flight in the Kosmos-936 satellite. G. P. Stupakov, A. I. Volozhin, V. V. Zasytkin, and S. M. Remizov. (*Mekhanika Kompozitnykh Materialov*, May-June 1980, p. 530-537.) *Mechanics of Composite Materials*, vol. 16, no. 3, Nov. 1980, p. 386-393. 13 refs. Translation.

A81-28248 A local mechanism for differential velocity detection. S. P. McKee (California, University, Berkeley, Calif.). *Vision Research*, vol. 21, no. 4, 1981, p. 491-500. 29 refs. Grant No. NIH-EY-00592.

Differential velocity detection in the fovea was used to probe the properties of a local motion mechanism. Human observers can detect differences in velocity of less than 5% even for a 200 msec target duration. This precision is not based on variations in the distance traversed by the target or in the total target duration. The relevant timing signal for velocity is the detection of a difference in stimulus onset time at spatially separate points. This onset asynchrony detection is shown to be very precise for small spatial separations. Discontinuous stimuli (apparent motion) are adequate substitutes for continuous motion in velocity judgments provided that the spatial interval between target presentations is less than 20 min arc.

(Author)

A81-28249 * Eye torsion and the apparent horizon under head tilt and visual field rotation. B. H. Merker and R. Held (MIT, Cambridge, Mass.). *Vision Research*, vol. 21, no. 4, 1981, p. 543-547. 11 refs. Grants No. NGL-22-009-308; No. NIH-5-R01-EY-01191; No. NIH-1-R01-EY-02649.

Two different experimental manipulations, namely head tilt and the viewing of a visual display rotating around the line of sight, induce torsional displacements of the eyes and a tilting of the apparent horizon. The present study examines the routes by which visual (field rotation) and otolith-proprioceptive (head tilt) sources of afference influence horizon judgments. In particular, the relationship between torsional eye movements and horizon estimates is addressed. The results indicate that visual and otolith-proprioceptive information sum directly in their influence on eye torsion, but interact more complexly in horizon estimates, indicating a dissociation of their central determinants. (Author)

A81-28250 * A binocular contribution to the production of optokinetic nystagmus in normal and stereoblind subjects. J. M. Wolfe, R. Held, and J. A. Bauer, Jr. (MIT, Cambridge, Mass.). *Vision Research*, vol. 21, no. 4, 1981, p. 587-590. 11 refs. Grants No. NGL-22-009-308; No. NIH-5-P30-EY-02621; No. NIH-3-R01-EY-01191; No. NIH-1-T31-GM-07484.

Viewing a large patterned field moving in one direction produces a regular pattern of eye movements known as optokinetic nystagmus (OKN). Fox et al. (1978) showed that the mechanism producing OKN can utilize purely binocular or 'cyclopean' input. Experiments reported confirm that finding and extend it to demonstrate that the binocularity of this mechanism is not disrupted in subjects who lack stereopsis. This result indicates that there exists more than one binocular process in the visual system. (Author)

A81-28387 Dependence of electromagnetic energy deposition upon angle of incidence for an inhomogeneous block model of man under plane-wave irradiation. M. J. Hagmann, I. Chatterjee, and O. P. Gandhi (Utah, University, Salt Lake City, Utah). *IEEE Transactions on Microwave Theory and Techniques*, vol. MTT-29, Mar. 1981, p. 252-255. 6 refs. Grant No. NIH-1-R01-ES-02304.

A81-28388 * Dual-mode microwave system to enhance early detection of cancer. K. L. Carr (Microwave Associates, Inc., Burlington, Mass.), A. M. El-Mahdi, and J. Shaeffer (Eastern Virginia Medical School, Norfolk, Va.). *IEEE Transactions on Microwave Theory and Techniques*, vol. MTT-29, Mar. 1981, p. 256-260. 7 refs. Contract No. NAS1-15393.

A dual-mode microwave system has been developed that will permit early detection of cancer. The system combines the use of the passive microwave radiometer with an active transmitter. The active transmitter will provide localized heating to enhance early detection by taking advantage of the differential heating (i.e., tumor temperature with respect to surrounding tissue) associated with the thermal characteristics of tumors. (Author)

A81-28612 The origin of genetic information. M. Eigen (Max-Planck-Institut für biophysikalische Chemie, Göttingen, West Germany), W. Gardiner (Texas, University, Austin, Tex.), P. Schuster (Wien, Universität, Vienna, Austria), and R. Winkler-Oswatitsch. *Scientific American*, vol. 244, Apr. 1981, p. 88-92 (12 ff.).

Consideration is given to the laws governing the evolution of prebiotic molecules. Following a brief review of the conditions on the early earth, considerations of the chemical properties of the current biological informational molecules, DNA and RNA, are used to deduce that the first genes were most likely short sequences of RNA which could both lead to stable secondary structures and be reliably reproduced. Experiments with the de novo synthesis of RNA from nucleotide triphosphates and enzyme demonstrating the preferential amplification of a changing nucleotide sequence are discussed as high-efficiency models of prebiotic selection and evolution, and enzyme-free studies showing that RNA can replicate itself without enzymes are indicated. Attention is then given to the quasi-species model of competition (for free monomers) in molecular self-replication, and to the necessary invention of DNA, proteins and genetic recombination processes in order to permit the reduction of the error rate and lengthening of replicable RNA sequences, which is explained in terms of a hypercycle model of second-order autocatalysis. The compartmentation of the hypercyclically organized quasi-species is then discussed as a means for evaluating the information in genetic messages, leading to evolutionary improvement. Problems remaining to be solved before experiments on the self-organization of protein translation can be designed are then indicated, with particular attention given to the evolution of the genetic code. S.C.S.

A81-28633 Contrast sensitivity difference between spatial sine-wave and square-wave gratings of the human visual system. H. Isono (Japan Broadcasting Corp., Broadcasting Science Research Laboratories, Tokyo, Japan). *Electronics and Communications in Japan*, vol. 62, Jan. 1979, p. 21-25. 9 refs. Translation.

A81-28675 A methodology for quantifying the effects of aging on perceptual-motor capability. W. H. Levison (Bolt Beranek and Newman, Inc., Cambridge, Mass.). *Human Factors*, vol. 23, Feb. 1981, p. 87-96. 27 refs.

A methodology is described for providing a quantitative description of the effects of aging on human perceptual-motor capability. Specifically, application of the experimental and analytical techniques of manual control is suggested so that these effects can be quantified in terms of the parameters of a model for human perception and control. Important and immediate contributions to the study of aging can be expected from application of the methodology outlined in this paper. First, measures of perceptual-motor performance that are expected to be more sensitive to the effects of age than those usually available will be obtained. Second, these measures will be interpretable in terms of a model for human information processing that has been validated extensively for subjects in the 20- to 40-year age bracket. Using this model, one would be able to predict the effects of aging on a variety of tasks. Finally, a basis would be developed for a functional (rather than chronological) description of aging. (Author)

A81-28882 # Kinetic aspects of the chemical protection of proteins against the effects of radiation (Kineticheskie aspekty khimicheskoi zashchity belkov ot deistviia izlucheniia). I. I. Sapezhinskii (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 257, no. 1, 1981, p. 155-159. 15 refs. In Russian.

An X-ray chemiluminescence technique was used to study the radiation-protection effects of acceptors on proteins under conditions of radiative oxidation. These effects were investigated on the basis of kinetic chemiluminescence curves obtained for the irradiation of serum albumin and glycyl-tryptophan for a variety of experimental conditions. The experimental results are explained by a simplified kinetic model, which includes the reaction of the acceptor additive with active products of the radiolysis of water, and with primary and peroxide protein radicals. B.J.

A81-28899 The perception of verticality and the frame of reference of the visual tilt aftereffect. J. J. Rieser (Vanderbilt University, Nashville, Tenn.) and M. S. Banks (Texas, University, Austin, Tex.). *Perception and Psychophysics*, vol. 29, no. 2, Feb. 1981, p. 113-120. 20 refs. Grants No. NIH-HD-12572; No. NIH-HD-04510.

Previous research has suggested that the visual tilt aftereffect operates according to a gravitational frame of reference. Three experiments were conducted to test this conclusion further. In each experiment, observers (with head upright) adjusted an illuminated bar to apparent vertical following various adaptation conditions. In Experiment 1, observers were given clear visual cues for objective vertical while adjusting the bar. In Experiment 2, they were not given visual cues for vertical. The adaptation conditions in Experiments 1 and 2 consisted of various combinations of head and stimulus tilt. Experiment 3 investigated the effects of head tilt alone. The results indicated that the tilt aftereffect follows a retinal frame of reference under some conditions (Experiment 1) and appears to follow a gravitational frame under others (Experiment 2). These results can be predicted by a simple model involving two factors, a purely visual aftereffect that follows a retinal frame and an extravisual aftereffect that appears to follow a gravitational frame. (Author)

A81-28900 Velocity gradients and relative depth perception. M. L. Braunstein and G. J. Andersen (California, University, Irvine, Calif.). *Perception and Psychophysics*, vol. 29, no. 2, Feb. 1981, p. 145-155. 16 refs. NSF Grant No. BNS-76-81499.

The effectiveness of velocity gradients in providing relative depth information was assessed using random dot patterns translating horizontally. The gradients simulated two planes meeting at a horizontal line at the center, and subjects judged whether the center was the nearest or farthest part of the display. Accuracy increased with maximum dot speed, exceeding 90% in conditions combining the highest speed (10.4 deg/sec) and longer of two display durations (10 sec) with unrestricted fixation. Separate experiments examined a rotational component perceived in the motion of the planes and the latency in reporting a rigid organization of the displays. Possible reasons for the chance accuracy found by Farber and McConkie (1979) and alternative explanations of the effect of maximum dot speed on accuracy are discussed. A model is presented that accounts for the effects of dot speed and display duration on the accuracy of relative depth judgments. (Author)

A81-29143 # Pilot reaction to attitude gyro failure - A flight experiment. R. L. Newman (Dayton, University, Dayton; Crew System Consultants, Yellow Springs, Ohio) and D. L. Quam. *Canadian Aeronautics and Space Journal*, vol. 26, 4th Quarter, 1980, p. 303-310. 6 refs.

A flight experiment using a general aviation aircraft was conducted to determine the severity of navigation and control problems resulting from the loss of altitude gyro readings following vacuum system failure in instrument-flight weather. Nine subject pilots ranging in experience from 170 to 5100 hours flew hooded, simulated instrument-only missions with an unexpected gyro failure introduced at a critical point. All pilots were able to maintain control following the gyro failure, and although none flew a satisfactory landing approach, all would have found the airport safely given a ceiling of 1000 feet or more. O.C.

A81-29273 Exercise-induced regional wall motion abnormalities on radionuclide angiography. H. S. Hecht (Wadsworth Veterans Administration Medical Center, Los Angeles, Calif.) and J. M. Hopkins (California, University, Los Angeles, Calif.). *American Journal of Cardiology*, vol. 47, Apr. 1981, p. 861-865. 14 refs.

The possibility of using exercise-induced regional wall motion abnormalities seen in radionuclide angiography as an indicator of coronary artery disease is investigated. The occurrence of exercise-induced regional wall motion abnormalities was evaluated in 12 normal volunteers, 35 patients with coronary artery disease without valvular heart disease, and 19 patients with valvular heart disease and

normal coronary arteries undergoing maximal graded supine bicycle exercise during angiography. Regional wall motion abnormalities were apparent in none of the normal subjects, 63% of those with coronary artery disease, and 42% of those with valvular heart disease and no coronary artery disease, predominantly in an inferoapical location. The observation of regional wall motion abnormalities in patients without coronary artery disease thus represents a limitation to the sensitivity of exercise-induced wall motion as an indicator of coronary artery disease in patients with and without valvular heart disease. A.L.W.

A81-29274 Quantitative two dimensional echocardiography during bicycle exercise in normal subjects. W. Zuehl, P. Gueret, S. Meerbaum, D. Holt, and E. Corday (Cedars-Sinai Medical Center; California, University, Los Angeles, Calif.). *American Journal of Cardiology*, vol. 47, Apr. 1981, p. 866-873. 20 refs. Research supported by the American Heart Association, Jules Stein Foundation, Florence P. Hamilton Foundation, Ahmanson Foundation, W. M. Keck Foundation, and B. D. Mitchell Family Foundation; Grants No. NIH-HL-17651-05; No. NIH-HL-17651-06.

A study is presented of the quantification of heart function during bicycle exercise in normal young subjects by means of two-dimensional echocardiography. An 84 deg phased array sector scanner was employed to record two-dimensional echographic short axis left ventricular views and an apical four-chamber view in ten healthy male volunteers undergoing exercise in a supine 30 deg left lateral position. Two-dimensional echocardiographic indexes were obtained at rest and during peak exercise, including intraluminal left ventricular end-diastolic and end-systolic short axis areas at the mitral valve and papillary muscle levels and left ventricular volume. Observations of short-axis areas are found to be reproducible to within 2.9 to 8.3%, and to indicate a significant reduction in end-systolic volume and an increase in left ventricular ejection fraction in exercise as compared to rest. It is concluded that a standardized two-dimensional echocardiographic study provides good reproducibility of quantitative measurements of sectional as well as global left ventricular performance in normal subjects, and may be useful in patients with abnormal cardiac function. A.L.W.

A81-29315 # Characteristics of the functional mobility of the visual analyzer (Kharakteristika funktsional'noi podvizhnosti zritel'nogo analizatora). V. I. Shostak and E. B. Stepanian (Voenno-Meditsinskaya Akademiya, Leningrad, USSR). *Fiziologiya Cheloveka*, vol. 7, Jan.-Feb. 1981, p. 29-33. 8 refs. In Russian.

The dependence of critical flicker fusion frequency on the brightness, area, spectral content and retinal location of flickering light is investigated in a study of the mobility of the human visual analyzer. Critical frequencies for the fusion of white, green, red and blue-light images of 1.5-msec duration repeated at 0 to 50 Hz with angular sizes from 1 to 20 deg seen at angles from 0 to 90 deg from the visual axis were determined in monocular experiments for eight subjects with normal vision. The critical flicker fusion frequency is found to increase with increasing image intensity and area, and to depend on image color, which not only determines the critical frequency under identical conditions but also the variation of critical frequency with image angle and size. The functional mobility of the visual analyzer is thus concluded to be differentiated according to the structures of the sensory elements and depend on the processes of temporal and spatial summation within the elements. A.L.W.

A81-29316 # The coordination of eye and head movements during the gaze fixation reaction (Koordinatsiya dvizhenii glaz i golovy pri osushchestvlenii reaktsii ustanovki vzora). I. B. Kozlovskaya, Iu. V. Kreidich, A. A. Repin, and V. A. Barmin. *Fiziologiya Cheloveka*, vol. 7, Jan.-Feb. 1981, p. 34-39. 10 refs. In Russian.

The characteristics of the coordination of eye and head movements during the head-turning response to the detection of a stimulus in the peripheral visual field are investigated in humans. Subjects with normal vision were asked to fix their gaze as quickly and accurately as possible on visual targets appearing randomly at

angles from 20 to 60 deg from the center of the visual field, and eye and head movements in the horizontal plane were monitored along with neck muscle activity. The spatial and temporal characteristics of the eye and head reactions in humans are found to be similar to those observed previously in other primates, indicating that the controlling mechanisms are identical. Two types of response are observed: head motion beginning earlier and at low speed with amplitude commensurate with the saccade, and head turning delayed somewhat with large amplitude and speed. The results thus suggest that in humans and other primates the parameters of head movements and saccades are independently programmed. A.L.W.

A81-29317 # The dynamics of psychophysiological and cardiovascular indicators during operator activity in the expectation and tracking regimes (Dinamika psikhofiziologicheskikh i serdечно-sosudistyykh pokazatelei pri operatorskoi deiatel'nosti v rezhime ozhidaniia i slezheniia). N. I. Sapova and T. A. Pavlova. *Fiziologiya Cheloveka*, vol. 7, Jan.-Feb. 1981, p. 76-80. 10 refs. In Russian.

The physiological changes occurring in humans during four hours of operator activity in expectation and tracking tasks of various signal densities under different microclimatic conditions are investigated. Arterial pressure measurements, electrocardiograms, polycardiograms, rheoencephalograms, rheovasograms, heart stroke and minute volumes, and responses to orthostatic tests were obtained for 10 subjects before, during and after a period of intermittent signal counting and operational memory tasks performed at room temperature and at 43 C. A decrease in the functional condition of the brain is observed in all situations as a result of the relative sensory deprivation, hypokinesia and monotonous nature of the stimuli encountered. The operators are found to be capable of adapting to the heat with little decrease in task performance, although changes in functional condition are more marked. Finally, the physiological condition and performance of the operators is not observed to depend on stimulus density. A.L.W.

A81-29318 # The evaluation of the state of stress of an operator according to electrocardiogram statistical characteristics (Otsenka sostoiianiia napriazhennosti operatora po statisticheskim kharakteristikam elektrokardiogrammy). V. V. Romanov, V. M. L'vov, Iu. I. Smirnov, and Iu. I. Shorokhov (Kalininskii Politekhnikheskii Institut, Kalinin, USSR). *Fiziologiya Cheloveka*, vol. 7, Jan.-Feb. 1981, p. 81-86. 25 refs. In Russian.

The use of the statistical characteristics of electrocardiograms in the evaluation of the state of operator stress in the course of duties is investigated. R-R intervals were recorded for six subjects in the process of a discrete sensorimotor task involving various levels of stress, in which three alternative responses to light signals appearing at various frequencies are possible. Analysis of the mathematical expectation, standard deviation, mode, median and third and fourth moments of the 250 values of the R-R interval obtained reveals a sharp decrease in respiratory arrhythmia and an increase in pulse rate to be characteristic of the stressed state, with the greatest changes observed in the transition from rest to a moderate load. It is found that an indicator combining unidirectional changes in the mathematical expectation and dispersion of the duration of the R-R interval provides an effective means for the evaluation of operator stress states. A.L.W.

A81-29319 # Comparative analysis of human tolerance to prolonged loading at various gravitational gradients (Sravnitel'naia kharakteristika ustoichivosti cheloveka k dlitel'nym vozdeistviyam peregruzok s razlichnymi gravitatsionnymi gradientami). I. F. Vil'Vil'iams. *Fiziologiya Cheloveka*, vol. 7, Jan.-Feb. 1981, p. 87-90. 9 refs. In Russian.

Human responses to prolonged exposure to longitudinal gravitational loadings with various head-to-pelvis gradients are investigated in light of the proposal to employ short-axis centrifuges on manned spacecraft. Subjects were exposed to accelerations of 1, 1.5 and 2 G on a 7.25-m radius centrifuge for 60 to 90 min with a head-to-foot gravity gradient of 20%, and accelerations of 0.8, 1.2 and 1.6 G on a 1.74-m radius centrifuge for periods of 40 to 60 min with an

acceleration gradient of 100%. Decreases in tolerance as evidenced by electrocardiograms, photoplethysmography of the earlobe, and blood pressure measurements were observed in 5.8% of the 86 trials run on the medium-axis centrifuge, associated with the disruption of regional blood circulation in the vessels of the head. Decreases in tolerance to high gravity gradients are only found in 2.2% of the 409 studies conducted on the short-axis centrifuge, which were connected with vestibular disturbances. Results thus allow the recommendation of a short axis centrifuge as a means of protecting against the effects of weightlessness in the space environment. A.L.W.

A81-29320 # The effects of water and water-saline loads on orthostatic reactions in healthy people (Vliianie vodnykh i vodno-solevykh nagruzok u zdorovykh liudei na ortostaticheskie reaktsii). I. S. Balakhovskii and I. G. Dlusskaia. *Fiziologiya Cheloveka*, vol. 7, Jan.-Feb. 1981, p. 130-137. 9 refs. In Russian.

The effects of the ingestion of large amounts of water and aqueous saline solutions on cardiovascular system parameters and fluid volume shifts are investigated in light of the increase in orthostatic tolerance observed following water and water-saline loading. Heart rate and blood pressure were determined before and at 30-min intervals following the drinking of water or aqueous solutions containing 9 g NaCl of volume equivalent to 1.5 and 2% of body weight for subjects in the vertical and horizontal positions; changes in blood volume and intercellular fluid volume were also determined. It is found that the temporary increase in circulating blood volume is greater following the water loads, while only saline solutions act to significantly increase intercellular fluid volume. Both types of loading are observed to increase to the same degree diastolic blood pressure and reduce pulse rate somewhat in the lying position, and significantly reduce pulse rate in the standing position. A.L.W.

A81-29321 # The adjustment of the circadian rhythms of physiological functions during athletic training at various times of the day (Perestroika tsirkadnykh ritmov fiziologicheskikh funktsii pri sportivnykh trenirovkakh v raznoe vremia sutok). V. P. Zubanov, V. A. D'iachkov, M. P. Moshkin, and V. S. Posnyi (Kemerovskii Gosudarstvennyi Universitet, Kemerovo; Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologiya Cheloveka*, vol. 7, Jan.-Feb. 1981, p. 138-144. 32 refs. In Russian.

The effects of various daily rhythms of motor activity on the circadian rhythms of human cardiovascular, endocrine, electrolyte and muscular functions are investigated. Oral temperatures, arterial blood pressures, systolic and minute blood circulation volumes, the tonuses of the major arteries, salivary sodium, potassium and 11-oxy corticosteroid concentrations, maximal muscle forces and muscle blood circulation were determined every four hours during a two-week base period, and during periods of athletic training sessions at 7 a.m. or 7 p.m. Prolonged muscular activity in the early morning is found to cause changes in the circadian rhythms of the glucocorticoid functions of the adrenals and the indicators of cardiac activity, although not influencing muscular blood flow, vessel tonus or electrolyte concentrations. It is pointed out that while the adjustments in diurnal rhythms observed during periods of early morning training have adaptive significance, the lack of change in certain functional rhythms may help to explain the decreased effectiveness of morning training. A.L.W.

A81-29322 # Human memorizing of emotionally significant and neutral information during adaptation to different climatogeographic conditions (Zapominanie chelovekom emotsional'no znachimoi i neutral'noi informatsii v protsesse adaptatsii k razlichnym klimato-geograficheskim usloviyam). R. Iu. Il'iuchenok, V. P. Leutin, and E. I. Nikolaeva (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologiya Cheloveka*, vol. 7, Jan.-Feb. 1981, p. 145-151. 29 refs. In Russian.

The memorization of words of emotional significance at various stages of adaptation to different climatic and geographical conditions is investigated and compared with changes in physiological functions accompanying human information processing. Subject memories for lists of unrelated two-syllable words containing both emotionally

significant and neutral terms were determined while the subjects were residing in Novosibirsk, and 2, 3, 4, 11 and 21 days after a transmeridional flight to Yuzhno-Kurilsk or transfer to Altai (altitude 2600 m), along with ECG, EEG and skin galvanic responses. In the early stages of adaptation, a substantial improvement in the memorization of emotionally significant words and a worsening of the memorization of neutral words were observed, accompanied by a decrease in the general level of central nervous system activity. It is concluded that the active selection of biologically significant information and the subsequent improvement of memory processes are general characteristics of adaptation to different climatogeographic conditions. A.L.W.

A81-29695 # Investigations into the manual computer-aided piloting of a transport airplane along unconventional approach paths (Untersuchungen zur manuellen, reglergestützten Führung eines Transportflugzeugs auf unkonventionellen Anflugbahnen). W. Alles. Braunschweig, Technische Universität, Fakultät für Maschinenbau und Elektrotechnik, Dr.-Ing. Dissertation, 1980. 179 p. 57 refs. In German.

It is suggested that the ATC task in large terminal areas could be made easier by adjusting the approach paths to the prevailing air traffic situation. A computer-aided manual guidance system is proposed for use along such unconventional approach paths. It is shown by simulation that the system proposed provided small path deviations and a smaller pilot load than under normal manual approaches along conventional paths. V.P.

A81-30232 Requirements definition and design guidelines for the man-machine interface. S. L. Smith (Mitre Corp., Bedford, Mass.). In: NAECON 1980; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 20-22, 1980. Volume 1. New York, Institute of Electrical and Electronics Engineers, Inc., 1980, p. 38-42. 6 refs.

The man-machine interface (MMI) is a critical element in the specification of computer software for on-line information systems. To help ensure effective MMI software design, a requirements matrix is proposed, categorizing the functional capabilities required for characteristic user tasks. Based on this matrix, design guidelines can be tailored to required capabilities. (Author)

A81-30277 The influence of +Gz on semicircular canal function. M. R. Coccia (Ohio State University, Columbus, Ohio) and J. S. Petrofsky (Wright State University, Dayton, Ohio). In: NAECON 1980; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 20-22, 1980. Volume 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1980, p. 510-515. 20 refs.

The effect of +Gz on semicircular canal function was examined in normal and otolith deficient mice. The horizontal semicircular canal function was determined by exposing individual mice to a series of intensity graded angular deceleration stimuli. The duration of post-rotatory nystagmus was recorded electronically and cupulograms constructed for each group of mice. Cupulogram analysis of both otolith intact and otolith deficient mice indicated that exposure to rotation, and the rotational component of centrifugation, have an inhibitory effect on duration of post-rotatory nystagmus. The level of inhibition following exposure to hypergravity was significantly greater in the otolith intact mice as compared with otolith deficient mice. Exposure to hypergravity did not increase inhibition in otolith deficient mice over the level produced by rotation alone. These data provide conclusive evidence that exposure to chronic hypergravity has a significant effect on the semicircular canal function and that this effect is mediated by the otolith organ. (Author)

A81-30278 Constant pressure reservoir for organ perfusion. D. Hanpeter, J. S. Petrofsky, and R. Moore (Wright State University, Dayton, Ohio). In: NAECON 1980; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 20-22, 1980. Volume 2. New York, Institute of

Electrical and Electronics Engineers, Inc., 1980, p. 516-519. 18 refs. Research supported by the American Heart Association.

This article describes a device which was designed to control the perfusion pressure of blood through skeletal muscle during electrically induced exercise. The system is composed of 2 portions, a reservoir which was designed to have low dead space and an electronics package to maintain the level of blood within a specified range within the reservoir. The perfusion pressure of the blood was controlled by pressurizing the reservoir with gas mixture consisting of 95% oxygen and 5% carbon dioxide. In this manner the blood gases were kept normal. Tests conducted on the reservoir and controller showed that the system was both inexpensive to build and provided an excellent control of blood perfusion pressure for physiological studies. (Author)

A81-30279 **Interactions between fatigue, muscle temperature, blood flow and the surface EMG.** J. S. Petrofsky and C. A. Phillips (Wright State University, Dayton, Ohio). In: NAECON 1980; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 20-22, 1980. Volume 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1980, p. 520-527. 40 refs. Contract No. F33615-78-C-0501.

The present investigation was conducted to examine the relationship between muscle temperature, muscle fatigue, and blood flow during fatiguing isometric contractions. First experiments were conducted to determine the magnitude of the changes in the surface EMG associated with isometric fatigue of the handgrip muscles. Finally, experiments were conducted to determine if these changes are subject to differences in skin and muscle blood flow and muscle temperature as might be found in the work place. The results of these experiments showed that muscle and skin blood flow had little effect on the amplitude and frequency of the surface EMG, however, both the temperature of the exercising muscle and fatigue resulted in a substantial reduction in the frequency and an increase in the amplitude of the surface EMG. (Author)

A81-30400 **Circadian variation in the latency of brainstem responses and its relation to body temperature.** N. K. Marshall and E. Donchin (Illinois, University, Champaign, Ill.). *Science*, vol. 212, Apr. 17, 1981, p. 356-358. 33 refs. Research supported by the Illinois Dept. of Developmental Disabilities; U.S. Environmental Protection Agency Grant No. R-805628010; Contracts No. N00014-76-C-0002; No. F49620-79-C-0233; No. F33615-79-C-0512.

~~The auditory-brainstem-response-varies-in-a-circadian-rhythm~~ that is negatively correlated with the circadian rhythm in oral temperature. The auditory brainstem responses and oral temperature were recorded every 3 hours from three healthy male subjects during a 2-day period. The data indicate that a reduction of 1 C in oral temperature is associated with an increase of 200 microseconds in the latency of wave V of the auditory brainstem response, and of 160 microseconds in the interval between waves I and V. (Author)

STAR ENTRIES

N81-20691*# National Aeronautics and Space Administration, Washington, D. C.

THE EFFECT OF IMMOBILIZATION AND 3 (BETA-AMINOETHYL)-1, 2, 4 TRIAZOL ON THE CALCIUM CONTENT IN GASTRIC TISSUES OF GUINEA PIGS DURING THE FORMATION OF EXPERIMENTAL ULCERS

L. L. Grechishkin and K. Ritling Jun. 1980 8 p refs Transl. into ENGLISH from Farmakol. Toksikol. (USSR), v. 39, no. 1, 1976 p 86-89 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Academy of Medical Sciences Inst. for Experimental Medicine, Leningrad (Contract NASw-3199)

(NASA-TM-75992) Avail: NTIS HC A02/MF A01 CSCL 06C

A sharp fall in the concentration of calcium in gastric tissues upon immobilization and after administration of the histamine analog was recorded. Similar shifts were seen to occur in the blood plasma as well. This implies that under the effect of different action, tissue dystrophy develops by following a common mechanism involving not only the adenylyl cyclase system, but that of calcium ion metabolism as well. The calcium ion content in the blood plasma and gastric tissues were measured by atomic absorption spectrophotometry. T.M.

N81-20692*# National Aeronautics and Space Administration, Washington, D. C.

ISLET IN WEIGHTLESSNESS: BIOLOGICAL EXPERIMENTS ON BOARD COSMOS 1129 SATELLITE

Yu. Zhuk Sep. 1980 7 p Transl. into ENGLISH from Izv. (Moscow), no. 228 (19293), 29 Sep. 1979 p 3, col. 1-3 Transl. by Scientific Translation Service, Santa Barbara, Calif. (Contract NASw-3198)

(NASA-TM-76396) Avail: NTIS HC A02/MF A01 CSCL 06C

Biological experiments planned as an international venture for COSMOS 1129 satellite include tests of: (1) adaptation of rats to conditions of weightlessness, and readaption to Earth's gravity; (2) possibility of fertilization and embryonic development in weightlessness; (3) heat exchange processes; (4) amount of gravity force preferred by fruit flies for laying eggs (given a choice of three centrifugal zones); (5) growth of higher plants from seeds; (6) effects of weightlessness on cells in culture and (7) radiation danger from heavy nuclei, and electrostatic protection from charged particles. Author

N81-20693*# National Aeronautics and Space Administration, Washington, D. C.

THE ROLE OF ACTH AND GLUCOCORTICOIDS IN NONENZYMATIC FIBRINOLYSIS DURING IMMOBILIZATION STRESS IN ANIMALS

B. A. Kudryashov, F. B. Shapiro, E. G. Lomovskaya, and L. A. Lyapina Jun. 1980 14 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 63, no. 5, 1977 p 735-741 Original language document was announced as A75-31019 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Moscow State Univ., (USSR) (Contract NASw-3198)

(NASA-TM-76175) Avail: NTIS HC A02/MF A01 CSCL 06C

The role of the altered hormonal status of an organism in the activation of the anticoagulative system during stress is investigated. The 30 minute immobilization stress was shown to raise significantly the nonenzymatic fibrinolytic activity of blood in rats. Combined with adrenocorticotropin (ACTH) the effect is still greater. Intravenous administration of 0.2 ml 0.01 percent solution of protamine sulphate prevented the nonenzymatic fibrinolysis induced by the stress. Administration of ACTH after protamine sulphate again raised the fibrinolysis. This suggests that ACTH stimulates the release of heparin. M.G.

N81-20694*# National Aeronautics and Space Administration, Washington, D. C.

CHANGES IN MAST CELLS AND IN PERMEABILITY OF MESENTERIC MICROVESSELS UNDER THE EFFECT OF IMMOBILIZATION AND ELECTROSTIMULATION

M. P. Gorizontova Jun. 1980 8 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 2, 1974 p 73-76 Transl. by Kanner (Leo) Associates, Redwood City, Calif. (Contract NASw-2790)

(NASA-TM-75988) Avail: NTIS HC A02/MF A01 CSCL 06C

It was shown that a reduction in the amount of mast cells in the mesentery and an increase in their degranulation was accompanied by an increase in vascular permeability of rat mesentery. It is supposed that immobilization and electrostimulation causing degranulation of mast cells prompted histamine and serotonin release from them, thus increasing the permeability of the venular portion of the microvascular bed. Prophylactic use of esculamin preparation with P-vitaminic activity decreased mast cell degranulation, which apparently prolonged the release of histamine and serotonin from them and normalized vascular permeability. T.M.

N81-20695*# National Aeronautics and Space Administration, Washington, D. C.

MORPHOLOGICAL CHANGES IN NEURONS OF THE HIND LIMB REFLEX ARC DURING LONG TERM IMMOBILIZATION

Z. Ya. Tkachenko Jun. 1980 6 p Transl. into ENGLISH from Fiziol. Zh., Akad. Nauk. Ukrainiy SSR (USSR), v. 9 no. 3, 1963 p 383-384 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Inst. of Physiology, Academy of Sciences, Kiev (Contract NASw-3199)

(NASA-TM-75939) Avail: NTIS HC A02/MF A01 CSCL 06C

Twelve adult rabbits were immobilized for 9 to 31 days, followed by histological study of the nerve processes of lumbar vertebra 7 and sacral vertebra 1, the sciatic nerve and the motor endings of the thigh muscles. In the spinal ganglia, dystrophic changes of increasing severity with immobilization time were found, including pericellular edema, vacuolized neuroplasm, pycnotic changes, cytolysis and destruction. Chromatophilic matter decreased and was partly bleached, and amitotic division occurred. A portion of the sciatic nerve fibers were argentophilic, and some fragmentary decomposition occurred. Considerable dystrophic changes occurred in the motor nerve endings. Author

N81-20696*# National Aeronautics and Space Administration, Washington, D. C.

EXPERIMENTAL JOINT IMMOBILIZATION IN GUINEA PIGS. EFFECTS ON THE KNEE JOINT

J. P. MarcondesdeSouza, F. F. Machado, A. Sesso, and V. Valeri Sep. 1980 32 p refs Transl. into ENGLISH from Rev. da Assoc. Med. Brasil (Brazil), v. 10, no. 7, 1964 p 159-175 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Faculty of Medicine of Ribeirao Preto (Brazil) (Contract NASw-3199)

(NASA-TM-76067) Avail: NTIS HC A03/MF A01 CSCL 06C

In young and adult guinea pigs, the aftermath experimentally induced by the immobilization of the knee joint in hyperextended forced position was studied. Joint immobilization which varied from one to nine weeks was attained by plaster. Eighty knee joints were examined macro and microscopically. Findings included: (1) muscular hypotrophy and joint stiffness in all animals, directly proportional to the length of immobilization; (2) haemarthrosis in the first week; (3) intra-articular fibrous tissue proliferation ending up with fibrous ankylosis; (4) hyaline articular cartilage erosions; (5) various degrees of destructive menisci changes. A tentative explanation of the fibrous tissue proliferation and of the cartilage changes is offered. S.F.

N81-20697*# National Aeronautics and Space Administration, Washington, D. C.

CHANGE IN ENERGY EXPENDITURE AND BRAIN AND

ADRENAL CONTENT OF CATECHOLAMINES IN RATS DURING MUSCULAR LOADING AND HYPOKINESIA

V. D. Rozanova, T. G. Savkiv, and N. A. Khodorova May 1980 11 p refs Transl. into ENGLISH from Fiziol. Zh. (USSR), v. 62, no. 2, 1976 p 304-309 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Academy of Medical Sciences, Moscow (Contract NASw-3198) (NASA-TM-76148) Avail: NTIS HC A02/MF A01 CSCL 06C

In male 1-7 month old rats, the growth and the protein content of skeletal muscles were higher than in female rats while the O₂ consumption and the heart rate were lower. This is combined with reduction of the thyroid gland weight and of catecholamine content in adrenals at the age of 7 months. The development of male and female rats (1-7 month) under conditions of systematic muscular loads increases the growth tempo and protein of skeletal muscles and intensifies the degree of reduction of energy expenditure and the heart rate. This is accomplished by the greater reduction of relative weight of the thyroid gland and, at the age of 7 months, by reduction of the noradrenaline content in the brainstem. Hypodynamic conditions have the exact opposite effect. Author

N81-20698* National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF SIX-MONTH HYPOKINESIA IN DOGS ON MINERAL COMPONENT, RECONSTRUCTION AND MECHANICAL PROPERTIES OF BONE TISSUE

A. I. Volozhin, M. P. Pavlova, I. Sh. Muradov, G. P. Stupakov, and V. A. Korzhenyants May 1980 10 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 6, Nov. - Dec. 1976 p 34-38 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by N. A. Semashko Moscow Medical Stomatological Inst. (USSR) (Contract NASw-3198) (NASA-TM-76168) Avail: NTIS HC A02/MF A01 CSCL 06C

Ca⁴⁵ incorporation into the bones of the limbs, particularly in the area of the muscle attachment increased in dogs as a result of 6 month hypokinesia. There were no phenomena of osteoporosis in the cortical layer of the diaphyses; however, changes in the form of osteons, an increase in the number of anastomoses between the channels and the thinning of the subperiosteal layer pointed to disturbances of the bone tissue reconstruction. Mineral saturation of the bone microstructures of the experimental dogs had a tendency to rise. No changes in the mechanical properties of the long bones occurred as a result of hypokinesia in dogs. Author

N81-20699* National Aeronautics and Space Administration, Washington, D. C.

COMPARISON OF EARLY REACTIONS OF THE BLOOD SYSTEM IN RATS TO IMMOBILIZATION, THE ACTION OF HYPOXIA AND THE ADMINISTRATION OF ERYTHROPOIETIN

P. D. Gorizontov, M. I. Fedotova, V. I. Gudim, and O. I. Belousova May 1980 12 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 3, May - Jun. 1977 p 41-49 Transl. by Scientific Translation Service, Santa Clara, Calif. (Contract NASw-3198) (NASA-TM-76169) Avail: NTIS HC A02/MF A01 CSCL 06C

Three series of experiments were simultaneously carried on rats with the purpose of studying the action of different stimulants on the blood system: rats were subjected to immobilization, hypoxic hypoxia and erythropoietin administration. Changes in various cellular forms in the bone marrow, the thymus and the spleen were studied. A unotypical reaction, as in stress, was noted during the first hours; a reduction of the cell count in the lymphoid organs, a reduction of granulocytes and an increase of lymphoid cells in the bone marrow. The differences were chiefly quantitative. This was followed by stimulation of myelo and erythropoiesis determined by the specific features of the action

applied. Nonspecific blood reaction was apparently due to activation of the adaptation mechanisms. Author

N81-20700* National Aeronautics and Space Administration, Washington, D. C.

PRELIMINARY RESULTS OF SCIENTIFIC RESEARCH ON BIOSATELLITE KOSMOS-1129

Aug. 1980 35 p Transl. into ENGLISH of "Predvaritelnyye Rezultaty Nauchnykh Issled. na Biosputnike Kosmos-1129" (USSR), Moscow, Min. of Health USSR and the Inst. of Med. and Biol., Probl. and the Interkosmos Council of the Acad. of Sci. USSR, 1980 p 1-37 Transl. by Kanner (Leo) Associates, Redwood City, Calif. (Contract NASw-3199) (NASA-TM-76287) Avail: NTIS HC A03/MF A01 CSCL 06C

The first physiological study aimed at deeper examination mechanisms of weightlessness and adaptation/readaptation is described. It dealt with metabolism, support motor changes and nonspecific changes connected with stress reaction. Wistar rats were used in a triple setup: flight/vivarium/biosatellite mockup. Animal condition was assessed on motor activity and body temperature. Extensive tables show weight, blood and enzyme analysis, etc. Animals groups were labeled: stress, behavior, body composition, biorhythm, ontogenesis. The second or biological study dealt with tumorous carrot tissues but humidity control was defective: some indices are reported such as cell membrane permeability, tissue respiration, etc. It also was concerned with a fowl embryogenetic experiment (Japanese quail) but mechanical effects on landing reduced its success. The third study, on radiation dosimetry, presents a little tabulated data but chiefly gives lists of satellite detector units of different kinds and from different countries. Author

N81-20701* National Aeronautics and Space Administration, Washington, D. C.

ACTIVITY OF CERTAIN ENZYMES IN SUBCELLULAR FRACTIONS OF RAT LIVER AFTER FLIGHT ON COSMOS 1129 BIOSATELLITE

R. A. Tigranyan and Ye. G. Vetrova Dec. 1980 16 p refs Transl. into ENGLISH of "Aktivnost Nekotorykh Fermentov v Subkletochnykh Fraktsiyakh Pecheni Krys. Posle Poleta Biosputnika Kosmos-1129" Moscow, 1980 p 1-20 Presented at the 11th Joint Soviet-Am. Working Group on Space Biol. and Med., Moscow, Oct. 1980 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Inst. of Medical and Biological Problems, Ministry of Health (USSR) (Contract NASw-3198) (NASA-TM-76472) Avail: NTIS HC A02/MF A01 CSCL 06C

Studies of the effect of extreme space flight factors on the conditions of oxidizing metabolism in rat liver are described. The animals were flown on the biosatellite Cosmos 936, and compared to a synchronous ground experiment. The material and methods utilized in the study are presented. T.M.

N81-20702* IIT Research Inst., Chicago, Ill.
DESIGN, CONSTRUCTION AND TESTING OF A dc BIOEFFECTS TEST ENCLOSURE FOR SMALL ANIMALS
Final Report, 26 Sep. 1978 - Jun. 1980

M. J. Frazier and M. M. Presche Nov. 1980 274 p refs (Contracts DE-FG01-78ET-10157; ET-78-C-01-3026) (DOE/RA-10157/1) Avail: NTIS HC A12/MF A01

The engineering development of a dc bioeffects test enclosure for small laboratory animals is described as well as the biological protocol for the use of such enclosures in the testing of animals to determine possible biological effects of the environment associated with HVDC transmission lines. The test enclosure is a modular unit which can house up to eight rat sized animals in individual compartments. Multiple test enclosures can be used to test larger numbers of animals. A prototype test enclosure was fabricated and tested to characterize its electrical performance characteristics. The test enclosure provides a simulation of the dominant environment associated with HVDC transmission lines; namely, a static electric field and an ion current density. A biological experimental design was developed for assessing the

effects of the dominant components of the HVDC transmission line environment. DOE

N81-20703* National Aeronautics and Space Administration. Pasadena Office, Calif.

MULTIFUNCTIONAL TRANSDUCER Patent

Cyril Feldstein (JPL), Gilbert W. Lewis (JPL), Virgil H. Culler (JPL), and Samuel Merrbaum, Inventors (to NASA) (JPL) Issued 10 Feb. 1981 13 p Filed 1 Jun. 1979 Supersedes N79-25737 (17 - 16, p 2176) Sponsored by NASA (NASA-Case-NPO-14329-1; US-Patent-4,249,417; US-Patent-Appl-SN-044432; US-Patent-Class-73-141A; US-Patent-Class-128-642; US-Patent-Class-128-774) Avail: US Patent and Trademark Office CSCL 06B

Several parameters of a small region of a muscle tissue or other object, can be simultaneously measured using with minimal traumatizing or damage of the object, a trifunctional transducer which can determine the force applied by a muscle fiber, the displacement of the fiber, and the change in thickness of the fiber. The transducer has three legs with inner ends joined together and outer ends formed to piece the tissue and remain within it. Two of the legs are relatively stiff, to measure force applied by the tissue, and a third leg is relatively flexible to measure displacement of the tissue relative to one or both stiff legs, and with the three legs lying in a common plane so that the force and displacement measurements all relate to the same direction of muscle movements. A flexible loop is attached to one of the stiff legs to measure changes in muscle thickness, with the upper end of the loop fixed to the leg and the lower end of the loop bearing against the surface of the tissue and being free to slide on the leg.

Official Gazette of the U.S. Patent and Trademark Office

N81-20705 Duke Univ., Durham, N. C.

THE VISCOELASTIC BEHAVIOR OF THE HUMAN INTER-VERTEBRAL DISC Ph.D. Thesis

Robert Allen Casper 1980 150 p

Avail: Univ. Microfilms Order No. 8105654

Intervertebral motion units were tested with posterior elements intact, removed (modified) just prior to testing, and after re-equilibration following posterior element removal. In both static and dynamic tests no significant difference was observed between intact and modified specimens if sufficient recovery time was allowed between testing. Marked changes were observed, however, for specimens which had been allowed to re-equilibrate following posterior element removal. For static tests, disc stiffness increased in both creep and relaxation tests. Creep rate and relaxation rate, on the other hand, appeared unaltered as a result of transection and re-equilibration. For dynamic tests initial stiffness increased substantially, but little difference was observed at higher deformation. Dissert. Abstr.

N81-20706 Northwestern Univ., Evanston, Ill.

HYPOXIA IN THE WALLS OF LARGE BLOOD VESSELS Ph.D. Thesis

Donald Gene Buerk 1980 273 p

Avail: Univ. Microfilms Order No. 8104696

Detailed oxygen partial pressure (PO₂) profiles were measured in normal respiring arterial tissue using Whalen-type (recessed cathode) oxygen electrodes under experimental conditions in vivo and in vitro. The outer blood vessel wall surface PO₂ was also measured in vivo. The methods for fabricating the standard Whalen-type and mechanically strengthened glass micropipette electrodes with cathode diameters less than 5 microns are described. Measurements for the largest blood vessels were obtained with a Whalen-type oxygen macroelectrode (cathode diameter 5-10 microns) housed in a 31 gauge (200 microns) hypodermic needle. The recessed cathode design was examined mathematically to predict the characteristics of electrodes with deep and shallow recesses. Dissert. Abstr.

N81-20707* Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex. Dept. of Physiology.

SPECIALIZED PHYSIOLOGICAL STUDIES IN SUPPORT OF MANNED SPACE FLIGHT Final Report

U. C. Luft Jul. 1980 110 p refs

(Contract NAS9-15483)

(NASA-CR-160936) Avail: NTIS HC A06/MF A01 CSCL 06P

The reversible changes that take place in the cardiovascular system during weightlessness were investigated. Particular attention was given to the assessment of cardiovascular functions during and after space missions. One of the most important of these functions is the amount of blood pumped by the heart per min at rest and during exercise of gravitational stress.

N81-20708* Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

TOLERANCE OF LOWER BODY NEGATIVE PRESSURE (LBNP) IN ENDURANCE RUNNERS, WEIGHTLIFTERS, SWIMMERS AND NONATHLETES Final Report

In its Spec. Physiol. Studies in Support of Manned Space Flight Jul. 1980 p 1-35 refs

Avail: NTIS HC A06/MF A01 CSCL 06P

Thirteen endurance runners (R), 12 weightlifters (WL), 12 swimmers (SW) and 10 nonathletes (NA) were tested for their tolerance of lower body negative pressure (LBNP) in consecutive 5 minute stages at -20, -30, -40, -50 and -60 torr. Each subject also performed an exercise test on a bicycle ergometer with progressive workloads to exhaustion to determined aerobic capacity. The R had a much higher aerobic capacity than any of the other groups, but a significantly lower LBNP tolerance. While responses in heart rate and pulse pressure were quite similar in all 4 groups, the rate of increase in leg volume relative to LBNP stress (leg compliance, LC) was considerably greater in R than in the other athletes and NA. The greater LC in R could be attributed not only to a more rapid shift of blood to the lower extremities but also to a greater tendency for edema formation, both contributing to a more rapid loss in effective central blood volume for a given LBNP stress. These results substantiate earlier observations which led to the conclusion that endurance running is not advisable as a training regimen for astronauts. R.C.T.

N81-20709* Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

NONINVASIVE AORTIC BLOODFLOW BY PULSED DOPPLER ECHOCARDIOGRAPHY (PDE) COMPARED TO CARDIAC OUTPUT BY THE DIRECT FICK PROCEDURE Final Report

In its Spec. Physiol. Studies in Support of Manned Space Flight Jul. 1980 p 36-48 refs

Avail: NTIS HC A06/MF A01 CSCL 06B

Left ventricular stroke volume was estimated from the systolic velocity integral in the ascending aorta by pulsed Doppler Echocardiography (PDE) and the cross sectional area of the aorta estimated by M mode echocardiography on 15 patients with coronary disease undergoing right catheterization for diagnostic purposes. Cardiac output was calculated from stroke volume and heart volume using the PDE method as well as the Fick procedure for comparison. The mean value for the cardiac output via the PDE method (4.42 L/min) was only 6% lower than for the cardiac output obtained from the Fick procedure (4.69 L/min) and the correlation between the two methods was excellent ($r=0.967$, p less than .01). The good agreement between the two methods demonstrates that the PDE technique offers a reliable noninvasive alternative for estimating cardiac output, requiring no active cooperation by the subject. It was concluded that the Doppler method is superior to the Fick method in that it provides beat by beat information on cardiac performance. R.C.T.

N81-20710* Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

BEAT BY BEAT STROKE VOLUME ASSESSMENT BY PDE IN UPRIGHT AND SUPINE EXERCISE Final Report

In its Spec. Physiol. Studies in Support of Manned Space Flight Jul. 1980 p 50-79 refs

Avail: NTIS HC A06/MF A01 CSCL 06P

A 3.0 MHz pulse Doppler echocardiograph was used to estimate instantaneous stroke volume and cardiac output in 8 men during steady state supine and upright exercise at 300 kpm/min which were compared with other studies utilizing invasive procedures. The mean transients in heart rate and stroke volume and cardiac output for the first 20 sec of exercise in each posture were then determined. Centerline blood velocities were obtained in the ascending aorta with the transducer positioned manually in the suprasternal notch. Mean supine values for stroke volume and cardiac output at rest and exercise were 111 (6.4) and 112 ml (9.7 L/min), respectively, for supine. The corresponding results for upright were 76 (5.6) and 92 ml (8.4 L/min). These values compare favorably with prior studies. The transient response of cardiac output following the onset of upright was about twice as fast as in S because of the rapid and almost immediate upsurge in stroke volume. In supine, only heart rate served to augment cardiac output as stroke volume initially fell. The faster initial aortic flow in upright must represent the rapid mobilization of pooled venous blood from the leg veins which more than accounts for the additional volume (184 ml) of blood passing through the aorta during upright compared with supine in the first 20 sec. R.C.T.

N81-20711*# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

INSTANTANEOUS STROKE VOLUME BY PDE DURING AND AFTER CONSTANT LBNP (-50 TORR) Final Report

In its Spec. Physiol. Studies in Support of Manned Space Flight Jul. 1980 p 80-91 refs

Avail: NTIS HC A06/MF A01 CSCL 06S

Six male subjects were exposed to -50 torr lower body negative pressure (LBNP) for 10 min while stroke volume was recorded beat by beat at regular intervals before, during and after release of LBNP. Stroke volume was calculated from the systolic velocity integral in the ascending aorta by pulsed Doppler echocardiography (PDE) and the cross sectional area of the vessel by M mode echocardiography. Changes in leg volume were recorded continuously and blood pressure was taken every minute. Stroke volume dropped by 51% of the control in the first 33 sec of LBNP and continued to decline slowly to -62% toward the end. Heart rate increased by 15% in the first 10 sec and was 22% above control at the end of exposure. The resulting cardiac output closely followed the course of stroke volume (-47% at 33 sec, -53% at 8 min) showing that the modest increase in heart rate did little to offset the drop in stroke volume. Leg volume increased markedly within the first 10 sec with a more gradual rise reaching +3.5% at the end. Upon sudden release of LBNP, leg volume dropped significantly during the first 3 sec simultaneously with an increase in stroke volume followed by a substantial decline in heart rate below the baseline. R.C.T.

N81-20712*# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

CHANGES IN CARDIAC OUTPUT AND TIBIAL ARTERY FLOW DURING AND AFTER PROGRESSIVE LBNP Final Report

In its Spec. Physiol. Studies in Support of Manned Space Flight Jul. 1980 p 92-104 refs

Avail: NTIS HC A06/MF A01 CSCL 06S

A 3.0 MHz Pulsed Doppler velocity meter (PD) was used to determine blood velocities in the ascending aorta from the suprasternal notch before, during and after progressive 5 min stages of lower body negative pressure (LBNP) in 7 subjects. Changes in stroke volume were calculated from the systolic velocity integrals. A unique 20 MHz PD was used to estimate bloodflow in the posterior tibial artery. With -20 torr mean stroke volume fell 11% and then continued to decline by 48% before LBNP was terminated. Mean tibial flow fell progressively with LBNP stress, due to an increase in reverse flow component and a reduction in peak forward flow and diameter. Stroke volume increased and heart rate fell dramatically during the first 15 sec of recovery. The LBNP was terminated early in 2 subjects because of vasovagal symptoms (V). During V the stroke volume rose 86% which more than compensated for the drop in heart rate. This implies that V is accompanied by a paradoxical increase in

venous return and that the reduction in HR is the primary cardiovascular event. During the first 15 sec of recovery these 2 subjects had a distinctive marked rise to heart rate reminiscent of the Bainbridge reflex. R.C.T.

N81-20713*# National Aeronautics and Space Administration, Washington, D. C.

IMPORTANCE OF PHOTOELECTRONYSTAGMOGRAPHY FOR CLINICAL STUDY OF THE VESTIBULAR FUNCTION
S. N. Khechinashvili, B. M. Zargaryan, and K. G. Karakozov Sep. 1980 10 p refs Transl. into ENGLISH from Zh. Ushnykh Nosovykh Gorlovykh Bolez. (USSR), no. 2, May - Jun. 1978 p 68-72 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Tbilisi S. M. Kirov State Inst. for Advanced Training for Advanced Physicians, (USSR)

(Contract NASw-3198)

(NASA-TM-76404) Avail: NTIS HC A02/MF A01 CSCL 06P

A photoelectric nystagmograph containing a flexible doubled glass fiber light guide was designed and tested. During electric stimulation of the vestibular analyzer a graphic recording of galvanic nystagmus was obtained. The use of flexible glass fiber guides for the connection of the patient with a light source and photoreceiver solves some methodical problems and allows the usage of powerful lighting and high fidelity photomultiplier. The usage of DC amplifiers while signal processing assures the elimination of the most important factors leading to errors in the evaluation of information during nystagmographic investigations. T.M.

N81-20714*# National Aeronautics and Space Administration, Washington, D. C.

PROGRAM FOR THE MEDICAL EXAMINATION (CONSULTATION) OF COSMONAUTS

Dec. 1980 28 p refs Transl. into ENGLISH of "Programma Meditsinskogo Obsledovaniya (Ekspertizy) Kosmonavtov" Moscow, Aug. 1980 p 1-24 Presented at 11th Joint Soviet-Am. Working Group on Space Biol. and Med., Moscow, Aug. 1980 p 1-24 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original document prep. by Inst. of Medical and Biological Problems, Ministry of Health, USSR

(Contract NASw-3198)

(NASA-TM-76471) Avail: NTIS HC A03/MF A01 CSCL 06E

The medical selection process used to screen cosmonaut candidates is outlined. The various stages of selection are discussed, and the specific types of medical examinations are described. Various criteria used for selection are presented. T.M.

N81-20715*# National Aeronautics and Space Administration, Washington, D. C.

SURGICAL ACCESS TO SEPARATE BRANCHES OF THE CAT VESTIBULAR NERVE

L. A. Radkevich and G. S. Ayzikov Jan. 1981 8 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 63, no. 12, 1977 p 1748-1751 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by the Scientific Research Inst. of Biological Testing of Chemical Compounds, Moscow

(Contract NASw-3198)

(NASA-TM-76478) Avail: NTIS HC A02/MF A01 CSCL 06C

A posteroventral approach for access to separate branches of the cat vestibular nerve is presented which permits simultaneous surgical access to the ampullary and otolithic nerves. Surgical procedures are discussed. A.R.H.

N81-20716*# National Aeronautics and Space Administration, Washington, D. C.

FUNCTIONAL-MORPHOLOGICAL PARALLELS OF THE HYPOTHALAMO-PITUITARY-ADRENAL SYSTEM RESPONSE REACTION TO LONG-TERM HYPOKINESIA

Ye. P. Tsvetov, S. I. Razin, and A. V. Rychko Apr. 1980 10 p refs Transl. into ENGLISH from Vrach. Delos (USSR), no. 9, 1975 p 9-14 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Vinnitsa Medical Inst. (USSR)

(Contract NASw-3199)
(NASA-TM-76001) Avail: NTIS HC A02/MF A01 CSCI
06S

The effect of 2 and 4 week hypokinesia regimens on the hypothalamo-pituitary-adrenal system (HPAS) was investigated in 110 inbred mice. Progressive exhaustion and pathological reorganization of the HPAS morphofunctional structures was revealed. On the basis of established facts of interlineary and interspecies differences in the HPAS response, it is suggested that the animal body response reaction to the long term effects of hypokinesia depends largely on its HPAS resistance and the values of this system's defensive adaptation potential. S.F.

N81-20717* National Aeronautics and Space Administration, Washington, D. C.

ROLE OF A DECREASE IN BODY HEAT CONTENT IN THE THERMOREGULATORY REACTION OF THE CONCHA AURICULAE VESSELS

N. A. Slepchuk and G. V. Rumyantsev Sep. 1980 14 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 64, no. 6, 1978 p 843-849 Original language document announced as A78-34787 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Academy of Sciences (USSR)

(Contract NASw-3198)
(NASA-TM-76370) Avail: NTIS HC A02/MF A01 CSCI
06P

At the constant ambient temperature 28-30 C the rabbit ear vessels were dilated and their temperature was 34.8/0.1 C. Administration of the 23-29 C water into the stomach entailed thermoregulatory constriction of the ear vessels within 15-25 min. The response occurred at various combinations of temperature changes in different parts of the body. The heat content of the rabbit body, as calculated by the blood temperature in the aorta arc, reduced by 266.3 + or - 26.2 cal/kg at the beginning of the response. The decrease in the organism heat content seems to serve as a signal for occurrence of a corresponding thermoregulatory response. Author

N81-20718* National Aeronautics and Space Administration, Washington, D. C.

CHARACTERISTICS OF VESTIBULOSENSORY REACTIONS STUDIED BY EXPERIMENTAL CALORIC TEST

V. Z. Kapranov Sep. 1980 6 p refs Transl. into ENGLISH from Vest. Otorinolaringol. (USSR), no. 1, Jan. - Feb. 1979 p 48-49 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(NASA-TM-76386) Avail: NTIS HC A02/MF A01 CSCI
06P

Vestibulo-sensory reactions were studied in 135 workers who were in contact with nitroethers, by the method of an experimental caloric test. The response vestibulo-sensory reactions were recorded by means of an electroencephalograph. The changes in the sensory reaction depended on the duration of the workers' contact with toxic agents. A study of illusion reactions by the labyrinth calorization widens diagnostic possibilities in the examination of functional condition of the vestibular analyser considerably. T.M.

N81-20719* National Aeronautics and Space Administration, Washington, D. C.

MENIERE'S DISEASE: A SURGEON'S TACTICS

I. Soldatov Sep. 1980 7 p Transl. into ENGLISH from Med. Gazeta (USSR), 20 Jun. 1979 p 3 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-3198)
(NASA-TM-76398) Avail: NTIS HC A02/MF A01 CSCI
06E

Surgical procedures for treating Meniere's disease are discussed. Based on the results of 250 operations, it is concluded that interventions are sufficiently effective not only with vestibular dysfunction, but also with hearing disorders. In surgical treatment of Meniere's disease, it is expedient to adhere to by-stage tactics: to start with the simplest and least traumatic interventions - operations on the nerves of the tympanic cavity,

and if these are ineffective to use more complex methods, including drainage or shunting of the endolymphatic sac. S.F.

N81-20720* National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF INACTION ON FUNCTION OF FAST AND SLOW MUSCLE SPINDLES

R. S. Arutyunyan Sep. 1980 11 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR im. I.M. Sechenova (USSR), v. 65, no. 12, Dec. 1979 p 1833-1837 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by I.M. Sechenov Inst. of Evolutionary Physiology and Biochemistry, Academy of Sciences, Leningrad

(Contract NASw-3198)
(NASA-TM-76374) Avail: NTIS HC A02/MF A01 CSCI
06P

There is no data on the comparative effect of tenotomy on the function of the muscle spindles of fast and slow muscles. This study covers this question. The experiments were conducted on cats. The musculus extensor digitorum longus (m. EDL) was selected as the fast muscle, and the musculus soleus (m. Sol.) as the slow. In a comparison of the spontaneous activity of primary and secondary endings of the fast and slow muscle spindles (i.e., the activity with complete relaxation of the muscles) normally no difference between them was successfully found. The authors recorded the integrative, and not the individual activity, and secondly, under conditions of such recording technique, those slight changes that are observed in the fast muscle receptors could remain unnoticed. Author

N81-20721* National Aeronautics and Space Administration, Washington, D. C.

OBJECTIVE APPRAISAL OF TOLERANCE TO VENTRICULOGRAPHY WITH VARIOUS RADIOCONTRAST MEDIA (ACCORDING TO ELECTRONYSTAGMOGRAPHY DATA)

N. S. Blagoveshchenskaya and V. L. Puchkov Sep. 1980 13 p refs Transl. into ENGLISH from Vop. Neirokhir. (USSR), no. 2, Mar.-Apr. 1980 p 47-52 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Inst. of Neurosurgery, Academy of Medical Sciences, Moscow

(Contract NASw-3199)
(NASA-TM-76340) Avail: NTIS HC A02/MF A01 CSCI
06E

The vestibulo oculomotor reflex (nystagmus) was recorded by means of electronystagmography in 33 neurosurgical patients in dynamics prior to and after ventriculography. For contrasting the ventricular system a water soluble medium (Conrey, dimer X or Amipak) was used in 18 patients and contrast mixtures of water soluble agents in combination with Myodil emulsion in 15. It was established that after ventriculography with water soluble media the trunk vestibular reactions in all types of nystagmus grew frequently and sharply and the vestibulovegetative reactions increased markedly. Author

N81-20722* Louisiana State Univ., Shreveport. Dept. of Orthopaedics.

DEVELOPMENT OF A NEW NONINVASIVE METHOD TO DETERMINE THE INTEGRITY OF BONE IN VIVO Final Technical Report

Subrata Saha 10 Nov. 1980 7 p refs
(Contract NAS9-15950)
(NASA-CR-160922) Avail: NTIS HC A02/MF A01 CSCI
06P

An electromagnetic sensor for monitoring elastic waves in bone was developed. It does not require the use of traction pins and the output is not affected by soft tissue properties, a difficulty commonly encountered when using ultrasonic and vibration methods to determine in vivo properties of bone. T.M.

N81-20723* National Aeronautics and Space Administration, Washington, D. C.

PATHOGENESIS OF SUDDEN DEATH FOLLOWING WATER IMMERSION (IMMERSION SYNDROME)

M. Buhning and H. F. Spies Mar. 1981 12 p refs Transl.

into ENGLISH from Z. fuer Rechtsmedezin (West Germany), v. 83, 1979 p 121-127 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Johann-Wolfgang-Goethe Univ., Frankfurt
(NASA-TM-76542) Avail: NTIS HC A02/MF A01 CSCL 06S

Sympathetic activity under cold stress is investigated. Predominantly vagal cardio-depressive reflexes are discussed besides currently known mechanisms of sudden death after water immersion. Pronounced circulatory centralization in diving animals as well as following exposure in cold water indicates additional sympathetic activity. In cold water baths of 15 C, measurements indicate an increase in plasma catecholamine levels by more than 300 percent. This may lead to cardiac arrhythmias by the following mechanisms: cold water essentially induces sinus bradycardia; brady- and tachycardiarrhythmias may supervene as secondary complications; sinusbradycardia may be enhanced by sympathetic hypertonus. Furthermore, ectopic dysrhythmias are liable to be induced by the strictly sympathetic innervation of the ventricle. Myocardial ischemia following a rise in peripheral blood pressure constitutes another arrhythmogenic factor. Some of these reactions are enhanced by alcohol intoxication. M.G.

N81-20724* National Aeronautics and Space Administration, Washington, D. C.

STUDY ON CONTRACTION AND RELAXATION OF EXPERIMENTALLY DENERVATED AND IMMOBILIZED MUSCLES: COMPARISON WITH DYSTROPHIC MUSCLES

M. Takamori, Mitsuhiro Tsujihata, Masataka Mori, Ryuji Hazama, and Yoshihiko Ide Feb. 1980 28 p refs Transl. into ENGLISH from Nippon Naika Gakkai Zasshi (Japan), v. 67, no. 3, 1978 p 25-35 Presented at the 5th Intern. Conf. of the Muscular Dystrophy Assoc., Durango, Colo., Jun. 1976, and at the 18th Conf. of the Japan. Acad. of Neurol., Nagoya, May 1977 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Nagasaki Univ. School of Medicine, Japan (NASA-TM-76053) Avail: NTIS HC A28/MF A01 CSCL 06P

The contraction-relaxation mechanism of experimentally denervated and immobilized muscles of the rabbit is examined. Results are compared with those of human dystrophic muscles, in order to elucidate the role and extent of the neurotrophic factor, and the role played by the intrinsic activity of muscle in connection with pathogenesis and pathophysiology of this disease. M.G.

N81-20725* National Aeronautics and Space Administration, Washington, D. C.

THE FUNCTIONAL STATUS OF THE HUMAN VESTIBULAR ANALYSOR FOLLOWING 56 DAYS IN AN AQUEOUS IMMERSION MEDIUM

E. I. Matsnev and Ye. B. Shulzhenko Feb. 1981 14 p refs Transl. into ENGLISH from Vestn. Otorinolaringol. (USSR), no. 2, 1976 p 18-24 Transl. by Kanner (Leo) Associates, Redwood City, Calif. (Contract NASw-3199) (NASA-TM-75888) Avail: NTIS HC A02/MF A01 CSCL 06P

Two male volunteers were kept hypokinetic in the immersion and physiological parameters were evaluated following the experiment. Prophylactic measures (g-forces, physical exercises, and supplementary salt and water) were applied daily. Caloric and equilibrium tests were utilized to evaluate the physiological responses. The functional changes observed after the 56 day immersion were found to be of a moderate type which normalized quite quickly. T.M.

N81-20726* National Aeronautics and Space Administration, Washington, D. C.

ACTIVITY OF THE RIGHT CARDIAC VENTRICLE AND METABOLISM IN HEALTHY PERSONS DURING AN ORTHOSTATIC TEST AFTER SHORT TERM IMMOBILIZATION

V. V. Chestukhin, V. Ye. Katkov, A. A. Seid-Gusaynov, B. I.

Shalnev, V. S. Georgiyevskiy, O. Kh. Zybin, V. M. Mikhaylov, and V. N. Utkin Feb. 1981 10 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 2, 1979 p 36-40 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Ministry of Public Health of the USSR, Moscow (Contract NASw-3199)

(NASA-TM-76519) Avail: NTIS HC A02/MF A01 CSCL 06P

A 15 minute orthostatic test was performed on healthy male volunteers under conditions of catheterization of the right ventricle of the heart and the radial (or brachial) artery before and after 5 day bedrest in an antiothostatic position of the body (with the foot of the bed raised 4.5 degrees). The change to a vertical position after immobilization was attended by a more marked increase in the rate of cardiac contractions, an increase of max dp/dt pressure in the right ventricle, and a decrease of cardiac and stroke indices. The decrease of the cardiac index was compensated for, to a certain measure, by a further increase in the extraction and utilization of O₂ by the tissues. The arterial blood pH did not change essentially, while the decrease in pCO₂ and content of standard bicarbonate was more marked.

Author

N81-20727* National Aeronautics and Space Administration, Washington, D. C.

THE ENZYME SPECTRUM OF THE SMALL INTESTINE WITH HYPODYNAMIA UNDER CONDITIONS OF HIGH TEMPERATURE

A. Abdusattarov May 1980 6 p refs Transl. into ENGLISH from Uzb. Biol. Zh. (USSR), no. 4, Jul. - Aug. 1978 p 80-81 Transl. by Scientific Translation Service, Santa Barbara, Calif. (Contract NASw-3198) (NASA-TM-76150) Avail: NTIS HC A02/MF A01 CSCL 06P

The influence of hypodynamia on the functioning of various body organs and systems is discussed. The methodology used and the results obtained are detailed. S.F.

N81-20728* National Aeronautics and Space Administration, Washington, D. C.

ORTHOSTATIC HYPOTENSION

J. Ninet Feb. 1981 11 p refs Transl. into ENGLISH from Lyon Medical (France), v. 244, no. 13, 1980 p 7-9 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Hopital Edouard-Herriot, Clinique Medicale A, France (Contract NASw-3199) (NASA-TM-75889) Avail: NTIS HC A02/MF A01 CSCL 06S

Basic orientation of the article, by the leader of a group of medical researchers associated with hospitals in Lyon, France, is toward definition and classification. A table divides OH (orthostatic hypotension) according to physiopathological classification into sympathicotonic and asympathicotonic types and then each of these into primary and secondary with subdivisions. The figure sketches organization and functioning of the baroreflex arc. Applications to clinical study of circulatory reflexes, listing measurement tests and the biological study of hormonal regulation listing the appropriate kinds of studies. Data are not given.

Author

N81-20729* School of Aerospace Medicine, Brooks AFB, Tex. **NUCLEAR SURVIVABILITY/VULNERABILITY OF AIRCREWS: AN EXPERIMENTAL APPROACH** Final Report, Jan. 1977 - Sep. 1980

Rayford P. Patrick, Alton J. Rahe, Neal E. Lof, Kenneth A. Hardy, and Robert E. Cordts Jan. 1981 38 p refs (AF Proj. 7757)

(AD-A095501; SAM-TR-81-1) Avail: NTIS HC A03/MF A01 CSCL 15/6

The complexity of modern manned-weapons systems requires maximal operator proficiency to insure mission success. This experiment was designed to determine, using trained subhuman primates, the effects of ionizing radiation upon tracking and discrete-avoidance behavior. During exposure to cobalt 60 gamma radiation given in divided doses over 7 1/2 hours, the monkeys

performed Multiple Alternative Reaction Time (MART) tasks and on the Primate Equilibrium Platform (PEP). Testing at two radiation levels is reported: a high-dose total of 1.440 rad (14.4 Gy) and a low-dose total of 360 rad (3.6 Gy). Testing and observation were done for a total of 10 hours on the day of irradiation for both radiation levels and on the day following irradiation for the high-dose level only. GRA

N81-20730# Desmatics, Inc., State College, Pa.
**COMPUTATIONAL ASPECTS OF INCORPORATING
 AUXILIARY INFORMATION INTO AN IMPACT ACCELERATION
 INJURY PREDICTION MODEL**

John J. Peterson and Dennis E. Smith Feb. 1981 21 p refs
 (Contract N00014-79-C-0128; NR Proj. 267-037)
 (AD-A095299; TR-112-7) Avail: NTIS HC A02/MF A01 CSCL
 12/1

Auxiliary information may sometimes be used in development of a mathematical model in order to improve the estimated values of unknown parameters. This report discusses computational procedures which allow the application of commonly used nonlinear estimation programs to incorporate various sources of auxiliary information into an impact acceleration injury prediction model. GRA

N81-20731*# Hamilton Standard, Windsor Locks, Conn.
**LIGHTSIDE ATMOSPHERIC REVITALIZATION SYSTEM
 Final Study Report, 1 Apr. - 30 Sep. 1980**

Arthur K. Colling, Ross J. Cushman, Mark M. Hultman, and John R. Nason Oct. 1980 166 p refs
 (Contract NAS9-13624)
 (NASA-CR-160897; SVHSR-7224) Avail: NTIS
 HC A08/MF A01 CSCL 06K

The system was studied as a replacement to the present baseline LiOH system for extended duration shuttle missions. The system consists of three subsystems: a solid amine water desorbed regenerable carbon dioxide removal system, a water vapor electrolysis oxygen generating system, and a Sabatier reactor carbon dioxide reduction system. The system is designed for use on a solar powered shuttle vehicle. The majority of the system's power requirements are utilized on the Sun side of each orbit, when solar power is available. T.M.

N81-20732# Los Alamos Scientific Lab., N. Mex.
**PERMEATION OF PROTECTIVE GARMENT MATERIAL BY
 LIQUID HALOGENATED ETHANES AND A POLYCHLORINATED
 BIPHENYL**

R. W. Weeks, Jr. and M. J. McLeod Oct. 1980 46 p refs
 (Contract W-7405-eng-36)
 (LA-8572-MS) Avail: NTIS HC A03/MF A01

The halogenated ethanes 1,2-dichloroethane; 1,1,1-trichloroethane and 1,1,2-trichloroethane are used as chemical intermediates and in metal working operations; and polychlorinated biphenyls (PCBs) were used in the past by the tens of millions of pounds in various roles in American industry. Because of the widespread use and hazardous or potentially carcinogenic nature of these compounds, the degree of protection which was afforded against these compounds by certain protective garment materials was studied. Materials evaluated included: butyl rubber; milled nitrile rubber; neoprene rubber latex; nitrile rubber latex; polyethylene; poly(vinyl alcohol); surgical rubber latex; Teflon; and Viton as well as the following composite or multilayered materials: butyl-coated nylon; polyethylen-coated Tyvek; polyurethane-coated nylon; and poly(vinyl chloride)-coated nylon. The breakthrough time at which each liquid phase compound permeated these materials was studied by the time lag method. DOE

N81-20733*# Hardin-Simmons Univ., Abilene, Tex. Science Research Center.

**RESPONSE OF SELECTED MICROORGANISMS TO
 EXPERIMENTAL PLANETARY ENVIRONMENTS Final
 Report, 30 Jun. 1979 - 31 Dec. 1980**

Terry L. Foster Feb. 1981 49 p refs
 (Grant NGR-44-095-001)
 (NASA-CR-164064; FR-11) Avail: NTIS HC A03/MF A01
 CSCL 06C

Anaerobic and aerobic sporeformers and non-sporeformers were cultivated anaerobically in nutrient media under various pressures (up to 1800 psi) of pure H₂, CH₄, NH₃, and H₂S. Viability assays were performed periodically to determine growth, survival, or spore survival. Hydrogen up to 1800 psi demonstrated little or no suppression of growth with the possible exception of *Bacillus coagulans* at 1800 psi. The obligate anaerobes grew very well. Under CH₄ the obligate anaerobes again exhibited the most prolific growth, whereas the facultative anaerobes grew well except under higher pressures. Ammonia at low pressure was extremely toxic to all test organisms. At 100 psi all populations were killed within 24 hours except *Staphylococcus aureus* which survived for 72 hours and the *Bacillus* spp. which produced a surviving population of approximately 10,000 spores/ml. All populations in H₂S were killed within 24 to 48 hours except *Proteus mirabilis* which decreased to 100 cells/ml and the *Bacillus* spp. Spore survival studies of two months duration demonstrated that *B. coagulans* and *B. pumilus* survived under all experimental conditions. *Clostridium novyi* type B and C. sporogenes were killed rapidly in NH₃ and H₂S and demonstrated no sporulation. Author

N81-20808# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany).

TEAMWORK IN TARGET ACQUISITION

D. Dey, N. Ninz, and H. Mutschler (Fraunhofer-Inst. fuer Informations- und Datenverarbeitung, Karlsruhe) In AGARD Image and Sensor Data Process. for Target Acquisition and Recognition Nov. 1980 16 p refs

Avail: NTIS HC A12/MF A01

N81-20978*# National Aeronautics and Space Administration, Washington, D. C.

LIFE SCIENCES: NO PLACE IN THE SUN

In its Beyond the Atmosphere: Early Years of Space Sci. 1980 p 274-282

Avail: NTIS MF A01; SOD HC \$11.00 CSCL 06C

The status of the life sciences within NASA is reviewed. The historical movement towards a unified life sciences program is discussed. M.G.

N81-21729*# National Aeronautics and Space Administration, Washington, D. C.

SPACELAB FLIGHT SIMULATED BY TWO MONKEYS AT CERMA

Pierre Langereux Aug. 1980 6 p refs Transl. into ENGLISH from Air Cosmos (France), no. 803, 1 Mar. 1980 p 33 Transl. by Scientific Translation Service, Santa Barbara, Calif. (Contract NASw-3198)

(NASA-TM-76390) Avail: NTIS HC A02/MF A01 CSCL 06C

A semiautomatic module for two monkeys was designed. The module shelters two Rhesus monkeys seated side by side in a compartment, reducing the emotional stresses caused by isolation. Food pellets, water, and air are supplied and body wastes are automatically removed. Physiological and environmental parameters are continually monitored, making possible the performance of experiments concerning the pathophysiological mechanisms of the disorders of weightlessness. A ten day flight of the module in Spacelab was simulated. J.D.H.

N81-21730*# Alabama Univ., Birmingham. Lab. of Membrane Biology.

**ELECTROPHORETIC CELL SEPARATION USING MICRO-
 SPHERES Final Report, 1 Oct. 1979 - 30 Sep. 1980**

A. Smolka and G. Sachs 1980 65 p refs Sponsored by NASA Prepared for JPL
 (Contract JPL-955534)
 (NASA-CR-164168; JPL-9950-522) Avail: NTIS
 HC A04/MF A01 CSCL 06C

Methods of cell separation based on the electrokinetic properties of the cell membrane offer a degree of discrimination among cell populations which is not available with methods based on cell size or density alone. Studies aimed at extending red cell separations using microspheres to purification of lymphocytes. T.M.

N81-21731*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ACTH-LIKE PEPTIDES INCREASE PAIN SENSITIVITY AND ANTAGONIZE OPIATE ANALGESIA

John P. Heybach and Joan Vernikos Mar. 1981 20 p refs (NASA-TM-81254; A-8418) Avail: NTIS HC A02/MF A01 CSCI 06E

The role of the pituitary and of ACTH in pain sensitivity was investigated in the rat. Pain sensitivity was assessed by measuring paw-lick and jump latencies in response to being placed on a grid at 55 C. Hypophysectomy reduced pain sensitivity, and this effect was reversed by the intracerebroventricular (ICV) injection of the opiate antagonist naloxone. Similarly, the analgesia produced by a dose of morphine was antagonized by the administration of ACTH or alpha-MSH. The peripheral injection of ACTH or alpha-MSH in normal rats did not increase pain sensitivity. However, ACTH administered ICV increased pain sensitivity within 10 min. The results indicate that the pituitary is the source of an endogenous opiate antagonist and hyperalgesic factor and that this factor is ACTH or an ACTH-like peptide. This activity resides in the N-terminal portion of the ACTH molecule since ACTH sub 4-10 is not active in this respect, nor does this activity require a free N-terminal serine since alpha-MSH appears to be almost as potent as the ACTH sub 1-24 peptide. It is concluded that ACTH-like peptides of pituitary origin act as endogenous hyperalgesic and opiate antagonistic factors. Author

N81-21732*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

STRESS ANTAGONIZES MORPHINE-INDUCED ANALGESIA IN RATS Final Report

Joan Vernikos, Lynn Shannon, and John P. Heybach Apr. 1981 18 p refs (NASA-TM-81282; A-8505) Avail: NTIS HC A02/MF A01 CSCI 06C

Exposure to restraint stress resulted in antagonism of the analgesic effect of administered morphine in adult male rats. This antagonism of morphine-induced analgesia by restraint stress was not affected by adrenalectomy one day prior to testing, suggesting that stress-induced secretion of corticosteroids is not critical to this antagonism. In addition, parenteral administration of exogenous adrenocorticotropin (ACTH) mimicked the effect of stress in antagonizing morphine's analgesic efficacy. The hypothesis that ACTH is an endogenous opiate antagonist involved in modulating pain sensitivity is supported. Author

N81-21733# University of Eastern New Mexico, Portales. **EFFECTS OF LOW-LEVEL RADIATION ON BIOLOGIC SYSTEMS: A LITERATURE REVIEW**

Troy L. Best, ed. and Barbara Hoditschek, ed. Dec. 1980 246 p refs (Contract DE-AC04-76DP-00789)

(SAND-80-7143) Avail: NTIS HC A11/MF A01

This review includes brief discussions of topics of particular interest, a listing of useful review articles, an extensive bibliography, and listings of sources that can be used to update this document in the future. The topics discussed include experimental studies, the linear hypothesis, medical effects, occupational effects, effects of exposure to naturally occurring radiation, consumer products, and laws and regulations. DOE

N81-21734# Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.

BIOLOGIC RESPONSE TO MICROWAVE/Rf ENERGY

Sol M. Michaelson 1980 4 p refs Presented at the 15th Ann. IMPI Symp. on Microwave Powers, Iowa City, 6 May 1980

(Contract DE-AC02-76EV-03490)

(UR-3490-1832; CONF-800501-2)

Avail: NTIS

HC A02/MF A01

A systematic and up to date review of observations and theoretical approaches to the biological effects and health implications of exposure to microwave/radiofrequency energies is presented. A primary objective is to review and place available information and concepts in proper perspective to understand and encourage the full potential for the beneficial uses of these

energies while at the same time preventing adverse effects to individuals exposed to microwaves/Rf. DOE

N81-21735# Joint Publications Research Service, Arlington, Va. Foreign Broadcast Information Service.

USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 15, NO. 1

5 Mar. 1981 149 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1 Jan. - Feb. 1981 (JPRS-77513) Avail: NTIS HC A07/MF A01

Several articles are presented addressing various physiological and psychophysiological effects associated with space flight. Problems concerning life support, weightlessness, hypokinesia, and space flight feeding are addressed.

N81-21736# Joint Publications Research Service, Arlington, Va.

PHARMACOLOGICAL AGENTS FOR THE PREVENTION AND TREATMENT OF MOTION SICKNESS

V. S. Shashkov and V. V. Sabayev In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 10-24 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1, Jan. - Feb. 1981 p 9-18

Avail: NTIS HC A07/MF A01

Therapeutic and preventive agents for the various forms of motion sickness (MS) are overviewed. It is suggested that successful development of effective agents for the treatment of seasickness is only possible by means of wise combinations of drugs referable to different classes of chemical compounds. One should abandon the search of preventive agents among narcotics and tranquilizers. Dopaminergic substances, metabolites, and antimetabolites merit special attention, since a set of physiological and biochemical factors plays the leading role in the pathogenesis of MS, and their essence must be identified. In addition, it is suggested that attention should be concentrated on methodology and informativeness of methods used for quantitative evaluation of the efficacy of drugs in experiments on animals and studies involving man. M.G.

N81-21737# Joint Publications Research Service, Arlington, Va.

RESULTS OF STUDIES OF VESTIBULAR FUNCTION AND SPATIAL PERCEPTION IN THE CREWS OF THE FIRST AND SECOND EXPEDITIONS ABOARD SALYUT-6 STATION

I. Ya. Yakovleva, L. N. Kornilova, G. D. Strykh, I. K. Tarasov, and V. N. Alekseyev In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 25-30 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1, Jan. - Feb. 1981 p 19-23

Avail: NTIS HC A07/MF A01

The results of studies of the vestibular function and spatial perception function in the crew members of long term (96 and 140 day) space missions aboard Salyut 6 are presented. Similar changes and individual variations are revealed. All the cosmonauts showed the following changes: increased reactivity of the otolith organ, decreased sensitivity of the cupular system, asymmetry of most parameters studied, and illusory reactions in flight. Individual reactions are as follows: level of changes, dynamics and time of recovery, development of vestibulo-vegetative symptomocomplex during early adaptation to zero g, signs of decline in vestibulo-vegetative tolerance postflight, and changes in reciprocal relations between the otolith organ and semicircular canals. M.G.

N81-21738# Joint Publications Research Service, Arlington, Va.

RESULTS OF VECTORCARDIOGRAPHIC EXAMINATIONS DURING AND AFTER LONG TERM SPACE FLIGHTS ABOARD THE SALYUT-6-SOYUZ ORBITAL COMPLEX

Z. A. Golubchikova, A. D. Yegorov, and V. V. Kalinichenko *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 31-25 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 23-26

Avail: NTIS HC A07/MF A01

Bioelectrical activity of the myocardium was examined during and after 96 and 140 day flights, both to assess the ongoing health status of the cosmonauts and to demonstrate the general patterns and mechanisms of changes in bioelectrical activity of the myocardium in the course of prolonged weightlessness. For this purpose, the electrocardiograms were recorded with subsequent analysis of the dynamics of magnitude and direction of electromotive forces of the heart during and after flights. Most marked changes in the form of a decrease in the integral spatial repolarization vector were seen postflight. This parameter did not return to normal during one month postflight. Depolarization vector and vector orientation remained essentially unchanged. M.G.

N81-21739# Joint Publications Research Service, Arlington, Va.

CONFORMITY WITH HUMAN REQUIREMENTS OF PROTEIN CONTAINED IN THE RATIONS FOR CREWS OF THE SALTUT-6 ORBITAL STATION

V. P. Bychkov, A. K. Sivuk, and I. I. Borodulina *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 36-39 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 26-29

Avail: NTIS HC A07/MF A01

Nitrogen metabolism in 16 test subjects and 8 cosmonauts kept on a diet containing dehydrated products and foodstuffs preserved by other methods (15 percent and 85 percent, respectively) was studied. The health state and excretion of end products of nitrogen metabolism in those people gave evidence that the dietary protein met well bodily requirements under normal conditions, in simulated flight, and in real flight aboard Salyut-6. M.G.

N81-21740# Joint Publications Research Service, Arlington, Va.

STATE OF COSMONAUTS' ADRENOHYPOPHYSEAL SYSTEM FOLLOWING ORBITAL FLIGHTS OF DIFFERENT DURATION

V. B. Noskov, I. S. Balakhovskiy, A. I. Grigoryev, I. G. Dlusskaya, and R. K. Kiselev *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 40-45 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 29-32

Avail: NTIS HC A07/MF A01

In order to assess the hypophyseal adrenal system and glucocorticoid activity, excretion of total 17 hydroxycorticosteroids (17-HOCS) was measured before and at R+1 day after a standard water load (20 ml/kg). Twenty-six cosmonauts were examined after flights of 2 to 140 days. Although the cosmonauts spent different times in weightlessness, the content and rate of glucocorticoid excretion in the urine during postflight water loads was 1.5 to 2 times higher than during preflight loads. This increased excretion of 17-HOCS was associated with their decreased reabsorption and/or increased glomerular secretion. The latter may be a manifestation of extrarenal action of adrenocorticotropin due to its hyperproduction immediately postflight. M.G.

N81-21741# Joint Publications Research Service, Arlington, Va.

EFFECTS OF SPACE FLIGHTS ON LYMPHOCYTE BLAST TRANSFORMATION IN COSMONAUTS' PERIPHERAL BLOOD

A. T. Lesnyak and R. Yu. Tashpulatov *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 46-48 refs Transl. into ENGLISH

from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 32-34

Avail: NTIS HC A07/MF A01

The postflight investigation of cell mediated immunity of seven cosmonauts showed a significant increase in spontaneous activity of lymphocytes of peripheral blood and a decrease in stimulation of lymphocytes cultured with phytohemagglutinin at R+0. Variations in these parameters were transient, remaining within physiological limits. Two cosmonauts displayed a stable increase in lymphocyte activity during a blast transformation test with *Staphylococcus aureus* culture filtrate. M.G.

N81-21742# Joint Publications Research Service, Arlington, Va.

CHANGES IN BODY MASS OF COSMONAUTS IN THE COURSE OF A 140-DAY SPACE FLIGHT

A. D. Yegorov, I. I. Kasyan, A. A. Zlatorunskiy, S. F. Khlopina, V. A. Talavrinov, I. A. Yevdokimova, Ye. M. Romanov, and V. I. Somov *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 49-51 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 34-36

Avail: NTIS HC A07/MF A01

During a 140 day space flight, body mass changes of two crew members were measured. No correlation between body mass losses and flight duration was found. Greatest body mass losses occurred on day 44 to 59 in one subject (2.3 to 2.4 kg) and on day 86 in the other. Mass measurement techniques are described. Later the losses decreased. The results suggest that body mass changes varied on an individual basis and depended on many spaceflight factors. M.G.

N81-21743# Joint Publications Research Service, Arlington, Va.

STUDY OF MASS-INERTIA CHARACTERISTICS OF HUMAN BODY SEGMENTS DURING 6-MONTH HYPOKINESIA BY THE GAMMA SCANNING METHOD

V. A. Tishler, V. M. Zatsiorskiy, and V. N. Seluyanov *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 52-59 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 36-42

Avail: NTIS HC A07/MF A01

A radioisotope method of determining mass-inertia characteristics of human body segments is described and the utilization in measuring body masses of 18 test subjects exposed to 6 month hypokinesia is discussed. It was found that there was a distinct redistribution of body masses in the test subjects. Six of them (who did not exercise) showed losses of muscle mass (primarily antigravity muscles) and gain of adipose mass, and 12 test subjects (who exercised as a countermeasure against hypokinetic effects) displayed insignificant losses of muscle mass and significant gain of adipose mass. M.G.

N81-21744# Joint Publications Research Service, Arlington, Va.

CHEMICAL COMPOSITION OF MINERAL COMPONENT OF HUMAN VERTEBRAE AND CALCANEUS AFTER HYPOKINESIA

A. I. Volozhin, I. Ye. Didenko, and G. P. Stupakov *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 60-63 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan.-Feb. 1981 p 43-44

Avail: NTIS HC A07/MF A01

The chemical composition of human bone tissue during long-term hypokinesia was investigated. Hypokinesia of 20 to 42 days led to a decrease of Ca content and increase of K and Na content in the mineral component of human vertebrae; the Mg and P content remaining unchanged. It is suggested that these changes resulted from shifts in ion metabolism on the surface of hydroxyl-apatite crystals as well as from an increase

in the content of calcium phosphate amorphous component. The hypokinesia did not cause chemical changes in the inorganic component of os calcis, probably due to the low metabolic activity of its microstructures. After hypokinetic exposure the mineral density of vertebrae and os calcis did not differ from the control value, i.e., no osteoporosis was seen. M.G.

N81-21745# Joint Publications Research Service, Arlington, Va.

EFFECT OF REMAINING BRIEFLY IN ORTHOSTATIC AND ANTIORTHOSTATIC POSITIONS ON MAN'S TRACKING PERFORMANCE

Yu. N. Taranenko *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 64-68 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1, Jan. - Feb. 1981 p 45-48*

Avail: NTIS HC A07/MF A01

Tracking performance under the influence of being in orthostatic and antiorthostatic positions was investigated. A special trainer was used made of a table allowing tilts in the frontal plane equipped with a potentiometric control stick and electron-ray indicator. The results demonstrated that a 30 min exposure to orthostasis or antiorthostasis deteriorated significantly the tracking capacity. It is assumed that the changes were induced by hemodynamic effects due to body position changes. M.G.

N81-21746# Joint Publications Research Service, Arlington, Va.

STATE OF PERIPHERAL BLOOD AS RELATED TO ALTERED DIET AND STRESS

M. V. Markaryan *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 69-72 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1, Jan. - Feb. 1981 p 48-51*

Avail: NTIS HC A07/MF A01

The effect of diets prepared for prolonged space flights and stress exposures on peripheral blood of 42 healthy male test subjects was studied. The morphology of peripheral blood remained essentially unaltered when test subjects were given dehydrated diets (freshly prepared, stored for 2 years and exposed to proton irradiation at a dose of 24,000 rad) or Salyut-6 space diet. Stress Effects brought about neutrophil leukocytosis and lymphopenia which could be prevented with dietary supplements. Author

N81-21747# Joint Publications Research Service, Arlington, Va.

EFFICACY OF ALIMENTARY FACTORS IN THE RECOVERY PERIOD FOLLOWING LONG-TERM ANTIORTHOSTATIC HYPOKINESIA

V. P. Bychkov, K. V. Smirnov, and A. S. Ushakov *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 73-76 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1, Jan. - Feb. 1981 p 51-53*

Avail: NTIS HC A07/MF A01

The effects of antiorthostatic hypokinesia on the alimentary status of 8 men ranging in age from 36 to 40 years was investigated. Specific emphasis was placed on the parameters of body weight, metabolism (protein, lipid, carbohydrate, vitamin, mineral), and digestive function. The study consisted of three periods: the background period; the hypokinesia period; and the recovery period. The diet of the subjects was strictly regulated and differentiated in accordance with these three periods. Results indicate that diet is a significant factor with respect to the recovery of health status after prolonged head tilt. R.C.T.

N81-21748# Joint Publications Research Service, Arlington, Va.

EFFECT OF LEVEL OF MOTOR ACTIVITY ON AEROBIC EFFICIENCY IN HEALTHY MAN

G. V. Machinskiy *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar.*

1981 p 77-80 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1, Jan. - Feb. 1981 p 54-56

Avail: NTIS HC A07/MF A01

The efficacy of physical exercise for endurance in the preservation of the functional capabilities of the cardiorespiratory system was examined in age from 20 to 40 years were investigated. Results indicate that aerobic performance of and individual depends on the degree of his normal motor activity. In subjects leading an active mode of life, the maximum oxygen uptake and general work capacity are significantly higher than those leading a sedentary mode of life. The results further indicate that people with diminished muscle activity should be encouraged to do regular exercises in order to maintain aerobic performance. R.C.T.

N81-21749# Joint Publications Research Service, Arlington, Va.

REGIONAL ANALGESIA BY CONDUCTION ANESTHESIA AND REFLEX THERAPY IN THE ACUTE RECOVERY PERIOD FOLLOWING ANTIORTHOSTATIC HYPOKINESIA

L. L. Stazhadze, A. V. Vabishchevich, V. N. Tsibulyak, G. V. Chubarov, A. A. Titov, M. N. Avakyan, Zh. M. Kudryashova, V. V. Lenskiy, and V. V. Bogomolov *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 81-85 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1, Jan. - Feb. 1981 p 57-60*

Avail: NTIS HC A07/MF A01

The constant tendency towards increased volume and complexity of special work done in orbit increases the risk of trauma to different parts of the body (dislocations, fractures, burns, etc.). An attempt was made to choose and use methods of controlling pain that would not themselves cause any additional and appreciable destabilization of systems that regulate homeostasis. Two methods of regional anesthesia were studied with respect to alleviating pain and preventing shock reactions in such cases. A total of six healthy male subjects were exposed to peridural anesthesia (3 subjects) and electroauricular anesthesia (3 subjects). Results indicate that the anesthetic effect is not accompanied by significant changes in hemodynamics or homeostasis. R.C.T.

N81-21750# Joint Publications Research Service, Arlington, Va.

ACCELERATIONS AFFECTING MAN IN STORMY WEATHER

V. N. Barnatskiy, A. T. Poleshchuk, A. A. Shipov, and V. A. Babushkin *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 87-88 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1, Jan. - Feb. 1981 p 61-62*

Avail: NTIS HC A07/MF A01

The characteristics of accelerations that occur during violent and harsh storms, to which man is exposed aboard ship were studied. It is shown that as a storm develops, even when the ship is held strictly head into the wave, the incidence of seasickness increases. R.C.T.

N81-21751# Joint Publications Research Service, Arlington, Va.

STUDY OF HUMAN VESTIBULAR REACTIONS TO SIMULATED PERIODIC SHIP ROLLING

V. M. Gusev, T. A. Nalimova, and V. A. Kislyakov *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 89-95 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 15, no. 1, Jan. - Feb. 1981 p 63-66*

Avail: NTIS HC A07/MF A01

Hydromechanical reactions of the semicircular canal were investigated in the presence of periodic exogenous influences of the ship rolling type. Results indicate that these reactions can serve as rather accurate approximations of the vector of absolute

angular velocity of the human body. With the head in normal position in relation to the body, the influence of *crus commune* is manifested by improved approximation of components of absolute angular velocity that are represented by the vertical canals.
R.C.T.

N81-21752# Joint Publications Research Service, Arlington, Va.

HUMAN COLOR DISCRIMINATION DURING VESTIBULAR STIMULATION AFTER EXPOSURE TO BRIGHT LIGHT

Zh. M. Kudryashova and A. A. Shipov *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 96-101 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1 Jan. - Feb. 1981 p 66-70

Avail: NTIS HC A07/MF A01

Color discriminating functions were tested in subjects of both sexes in a situation often encountered when driving different vehicles, namely, during vestibular stimulation after exposure to very bright light. Results indicate that drastic changes in illumination, created by creating light of 2.5 times 10 to the third power to 50 times 10 to the third power nit, lead to temporary color blindness, diminish central color and brightness contrast sensitivity, as well as lower the level of functional stability of color discrimination.
R.C.T.

N81-21753# Joint Publications Research Service, Arlington, Va.

EFFECT OF SPECIFIC VOLUME ON FORMATION OF ATMOSPHERE IN SEALED COMPARTMENTS

V. P. Savina, Yu. G. Nefedov, T. I. Kuznetsova, V. Ye. Ryzhkova, K. N. Mikos, and K. V. Grishina *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 102-105 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1 Jan. - Feb. 1981 p 70-72

Avail: NTIS HC A07/MF A01

Atmosphere pollution with noxious gaseous trace contaminants exhaled by man in an enclosure was investigated as a function of free volume per man. The parameter is shown to depend on the environmental conditions: with increase in free volume the total level of atmosphere pollution decreased, being proportional to the concentration of gaseous trace contaminants in the exhaled air. Experimental curves of accumulation of gaseous chemicals exhaled by man were constructed.
R.C.T.

N81-21754# Joint Publications Research Service, Arlington, Va.

EFFECT OF SPACE FLIGHT FACTORS ON ULTRASTRUCTURE OF SKELETAL MUSCLES

K. D. Rokhlenko and Z. F. Savik *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 106-111 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 72-77

Avail: NTIS HC A07/MF A01

Ultrastructures of myofibers of the soleus and gastrocnemius muscles of rats flown in zero-g and 1 g were examined. It was found that 4.5 to 9 hours postflight the soleus of weightless rats showed focal destruction of the contractile and mitochondrial systems accompanied by metabolic changes in muscle fibers. Exposure to artificial gravity partially prevented changes in muscle fibers. Examinations of muscle fibers 25 days postflight demonstrated that the changes were reversible. No changes were observed in the mixed (gastrocnemius) muscle of both animal groups.
R.C.T.

N81-21755# Joint Publications Research Service, Arlington, Va.

ULTRASTRUCTURE OF THE MYOCARDIUM OF RATS FLOWN ABOARD THE COSMOS-936 BIOSATELLITE

K. D. Rokhlenko and P. Ya. Muldiyarov *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 112-118 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1 Jan. - Feb. 1981 p 77-82

Avail: NTIS HC A07/MF A01

Hearts of rats flown for 19.5 days aboard the biosatellite *Cosmos-936* and decapitated 4.5 to 9 hours or 25 days postflight were examined electron microscopically. Hearts of weightless rats sacrificed at R + 0 showed marked and consistent changes in capillaries and venules; myelination transformation of membranes of mitochondria and sarcoplasmic reticulum was observed in cardiomyocytes which did not show lysis. It is assumed that development of myelin bodies and increase in the number of auto phagosomes in weightless rats were caused by disintegration of mitochondrial and sarcoplasmic reticulum structures. Rats exposed inflight to artificial gravity displayed less pronounced submicroscopic changes.
R.C.T.

N81-21756# Joint Publications Research Service, Arlington, Va.

PHOSPHATASE ACTIVITY OF RAT ANTEBRACHIAL BONES AFTER FLIGHT ABOARD THE COSMOS-936 BIOSATELLITE

I. A. Popova and R. A. Tigranyan *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 119-122 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 82-84

Avail: NTIS HC A07/MF A01

Activities of alkaline and acid phosphatases in ulnar and radial bones of rats flown for 18.5 days aboard *Cosmos-936* and kept in a ground based mockup were investigated. In both bones activity of acid phosphatase increased significantly and that of alkaline phosphatase decreased 6 to 10 hours postflight; in the synchronous experiment the only change was a decrease in the activity of alkaline phosphatase in the radius. An exposure of rats to artificial gravity did not normalize changes in phosphatase activities observed postflight. At R + 25 phosphatase activity in bones of flight rats returned to normal and even tended to exceed the control level in synchronous animals.
R.C.T.

N81-21757# Joint Publications Research Service, Arlington, Va.

CHEMICAL COMPOSITION OF MINERAL COMPONENT OF RABBIT BONES AS RELATED TO 30-DAY HYPOKINESIA

I. Ye. Didenko and A. I. Volozhin *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 123-127 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 84-87

Avail: NTIS HC A07/MF A01

The mineral component of the bones of rabbits were exposed to hypokinesia for 30 days. There were no changes observed in the Ca and P content or in the Ca/P ratio but a decrease in the Mg, Na and K content was detected. Possible involvement of bone tissue in the maintenance of electrolyte composition during prolonged hypokinesia is discussed.
R.C.T.

N81-21758# Joint Publications Research Service, Arlington, Va.

EFFECT OF HYPERBARIC NITROGEN AND OXYGEN ATMOSPHERE ON ACTIVITY OF RESPIRATORY CENTER

I. S. Breslav, N. Z. Klyuyeva, and G. V. Troshikhin *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 1, Jan. - Feb. 1981 (JPRS-77513) 5 Mar. 1981 p 128-131 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (USSR)*, v. 15, no. 1, Jan. - Feb. 1981 p 88-89

Avail: NTIS HC A07/MF A01

In anesthetized cats inspiratory activity of the respiratory center at first increased and then decreased with increases in

total pressure of the nitrogen-oxygen atmosphere to 7. 11 and 21 atm (at normal PO₂). The effort made by respiratory muscles increased gradually. These changes were augmented by hypercapnia. Possible role of nitrogen anesthesia and compensatory reactions to the increased breathing resistance in the development of the above changes is discussed. R.C.T.

N81-21760* National Aeronautics and Space Administration, Washington, D. C.

GROUND EXPERIMENTS FOR FINDING PRINCIPLES AND WORKING OUT METHODS FOR PREVENTING ADVERSE EFFECTS OF WEIGHTLESSNESS ON THE HUMAN ORGANISM

L. I. Kakurin, A. I. Gregoryev, V. M. Mikhailov, and V. A. Tishler Dec. 1980 43 p refs Transl. into ENGLISH of "Nazemnyye Eksperimenty s Tsel'yu Obosnovaniya i Razrabotki Metodov Profilaktiki Neblagopriyatnogo Deystviya Nevesomosti na Organizm Cheloveka" Moscow, Oct. 1980 57 p Presented to the IX Joint Soviet-Am. Working Group on Space Biol. and Med., Moscow, Oct. 1980 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Inst. of Medical and Biological Problems, Soviet Ministry of Health, Moscow (Contract NASw-3199)

(NASA-TM-76465) Avail: NTIS HC A03/MF A01 CSCL 06P

A comparative assessment of the effectiveness of different prophylactic procedures to prevent the adverse effects of weightlessness is presented. It is concluded that: physical training is most effective but no single method by itself produces the full effect, and an adjustment of regimes to one another enhances the effect. The approved complex of prophylactic procedures affected basic changes occurring in hypokinesia: deficit of muscular activity, no or reduced BP hydrostatic component, reduced volume of blood circulation, reduced hydration level, and the application of various prophylactic complexes during 49 day antiorthostatic hypodynamia eliminated or reduced the adverse effects of weightlessness in simulation. M.G.

N81-21761* National Aeronautics and Space Administration, Washington, D. C.

THE PHYSIOLOGICAL EFFECTS OF DEHYDRATION CAUSED BY SWEAT LOSS

S. Israel Mar. 1981 24 p refs Transl. into ENGLISH from Med. u. Sport 20 (Leipzig), no. 10, 1980 p 300-306 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Inst. for Leisure and Recreational Sport, Leipzig (Contract NASw-3199)

(NASA-TM-75893) Avail: NTIS HC A02/MF A01 CSCL 06P

The mechanisms of fluid loss in the human body while sweating due to physical exercise are discussed. Trained and untrained persons were examined and compared. Since sweat is hypotonic, a disruption in the hydrosaline balance occurs; the consequences of this finding, also pertaining to the fluid and electrolytic substitution, are presented. Further explanations on the problem of dehydration refer to reactions of individual organ systems, to alterations in bodily capabilities as well as to questions relating to sex and age. Author

N81-21762* Oak Ridge National Lab., Tenn. Information Div.

SCIENTIFIC RATIONALE FOR THE SELECTION OF TOXICITY TESTING METHODS: HUMAN HEALTH ASSESSMENT

R. H. Ross, Michael G. Ryon, Mary W. Daugherty, John S. Drury, John T. Ensminger, and M. Virginia Cone Dec. 1980 423 p refs

(Contract W-7405-eng-26)

(ORNL/EIS-151; EPA-560/1-80-001) Avail: NTIS HC A18/MF A01

The first of a two part literature analysis of parameters associated with the various toxicity testing methods (test animal selection, pathology requirements, etc.) is reviewed. Acute, subchronic, chronic, and carcinogenic testing methods are covered; a discussion of some basic experimental considerations is included. DOE

N81-21763* Environmental Protection Agency, Washington, D.C. Office of Pesticides and Toxic Substances.

PROCEEDINGS OF THE WORKSHOP ON SUBCHRONIC TOXICITY TESTING

N. Page, Daljit Sawhney, and Michael G. Ryon Nov. 1980 70 p refs Workshop held at Denver, Colorado, 20-24 May 1979

(Contract W-7405-eng-26)

(ORNL/EIS-189; EPA-560/11-80-028) Avail: NTIS HC A04/MF A01

Subchronic toxicity procedures are designed to determine the adverse effects that may occur with repeated exposure over a part of the average life span of an experiment animal. The workshop objectives included critically examining the subchronic study as it might be applied to general chemical testing programs and evaluating the effect of variations in study parameters on assessment potential; identifying the deficiencies in the existing scientific knowledge and recommending research to strengthen the testing program; and identifying the related scientific issues to be resolved in future workshops or experimental programs. DOE

N81-21764* European Space Agency, Paris (France).

ANALYSIS OF HEART RATE VARIABILITY AS AN ESTIMATE OF PILOT WORKLOAD IN HUMAN ENGINEERING RESEARCH

Fred Volker Schick and Hans Radke Oct. 1980 32 p refs Transl. into ENGLISH of "Untersuchung der Pulsfrequenzvariabilität als Schätzgrösse der Pilotenbeanspruchung bei Anthropotech. Experimenten", DFVLR, Brunswick Report DFVLR-FB-79-33, Jul. 1979 Original report in GERMAN previously announced as N80-27086

(ESA-TT-653; DFVLR-FB-79-33) Avail: NTIS HC A03/MF A01

The usefulness of measurements of heart rate variability (HRV) for the assessment of pilot stress was studied in a laboratory experiment. A number of HRV parameters were recorded with respect to various experimentally controlled levels of mental workload. A tracking task with three levels of difficulty was presented to 12 test subjects. The heart rate variability was determined in the form of standard deviations, sums of absolute differences and the frequency of instantaneous heart rate reversals. The data were analyzed by statistical methods. The HRV parameters showed such a wide dispersion that it is not possible to detect differences in stress as a result of changes in task difficulty. Author (ESA)

N81-21765* California Univ., San Diego, La Jolla. Center for Human Information Processing.

UNDERSTANDING UNDERSTANDING Progress Report, Dec. 1978 - Dec. 1980

David E. Rumelhart Jan. 1981 40 p refs (Contract N00014-79-C-0323; Grant NSF BNS-76-15024; NR Proj. 157-437)

(AD-A096290; CHIP-100; CHIP-8101) Avail: NTIS HC A03/MF A01 CSCL 05/10

The schema theoretic view of comprehension is reviewed. Several techniques for the study of on-line measures of comprehension are developed. The techniques include a question probe technique and a reading time technique. Data were collected using each of these techniques and the results are compared with each other. The results are then interpreted in terms of a schema theoretical view of comprehension. GRA

N81-21766* Calspan Advanced Technology Center, Buffalo, N.Y.

VISUAL DETECTION MODEL FOR STRUCTURED TARGETS (PENVAL PROGRAM) Interim Report, 31 May - 30 Sep. 1979

Harry B. Hammill and William D. Fryer Nov. 1980 98 p refs (Contract F33615-78-C-1550)

(AD-A096084; CALSPAN-6364-X-13) Avail: NTIS HC A05/MF A01 CSCL 06/16

A mathematical/software model was generated for the purpose of predicting the visual detectability of aircraft (under conditions of search) based on target contrast structure when

average contrast is otherwise arbitrarily low. The model was partially validated and subsequently employed to investigate a series of target contrast structure functions. The report includes a complete mathematical development of the model and a fully documented software User's Guide. GRA

N81-21767# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Psychology.

KNOWLEDGE COMPILATION: MECHANISMS FOR THE AUTOMATIZATION OF COGNITIVE SKILLS

David M. Neves and John R. Anderson 25 Jul. 1980 55 p refs

(Contract N00014-78-C-0725; RR0420401)

(AD-A096117; TR-80-4) Avail: NTIS HC A04/MF A01 CSCL 05/9

People get better on a task with practice. In this paper we take this non-controversial statement, elaborate what it means to 'get better', and propose a mechanism that accounts for some of the ways people get better. We trace the development of a skill from the point when it is initially being memorized and applied in a slow and halting fashion to the point where it has become fast and automatic through practice. We are interested in how students learn to use postulates and theorems in geometry tasks. A scenario of how a student (based on two students we have looked at in detail in geometry and three subjects working on an artificial proof system) learns postulates is as follows. The student reads each of several postulates in a section of a textbook. After a brief inspection of the postulates the student goes on to the problems at the end of the section that require the student to use the postulates. In the student's initial attempts with the postulates there is much looking back to them in the textbook because they have not yet been committed to memory. These applications are slow and there is muttering that shows low level matching of the postulates like 'If A is RO and B is NY then I can assert that'. After some practice the student has committed the postulates to memory. After much practice their selection and application is very fast. GRA

N81-21768# European Space Agency, Paris (France).

INFLUENCE OF THE FLIGHT ALTITUDE AND LIMITATION OF THE FIELD OF VIEW ON THE VISIBILITY OF TARGETS ON THE GROUND AND THE MAXIMUM VISIBILITY FLIGHT ALTITUDE

Hans-Eberhard Hoffmann Jun. 1980 43 p refs Transl. into ENGLISH of 'Der Einfluss der Flughöhe u. Gesichtsfeldbegrenzung auf die Sichtbarkeit von Objekten am Boden u. die maximale Sichtbarkeitsflughöhe', DFVLR, Oberpfaffenhofen, West Germany Report DFVLR-FB-79-35 Original report in GERMAN previously announced as N80-27095

(ESA-TT-654; DFVLR-FB-79-35)

Avail: NTIS

HC A03/MF A01

The visibility of targets on the ground for observers in an aircraft was studied by means of naked eye observations from a helicopter. The maximum flight altitudes at which detection, recognition, or identification of ground targets is still possible were calculated under the assumption that the visibility distance is a logarithmic function of the altitude. The constants of this function were determined experimentally, and are given.

Author (ESA)

N81-21769*# National Aeronautics and Space Administration, Washington, D. C.

MACHINE INTELLIGENCE AND ROBOTICS: REPORT OF THE NASA STUDY GROUP Final Report

Mar. 1980 259 p refs

(NASA-TM-82329) Avail: NTIS HC A12/MF A01 CSCL 05H

Opportunities for the application of machine intelligence and robotics in NASA missions and systems were identified. The benefits of successful adoption of machine intelligence and robotics techniques were estimated and forecasts were prepared to show their growth potential. Program options for research, advanced development, and implementation of machine intelligence and robot technology for use in program planning are presented.

T.M.

N81-21770*# Life Systems, Inc., Cleveland, Ohio.

FRACTIONAL CAPACITY ELECTROLYZER DEVELOPMENT FOR CO2 AND H2O ELECTROLYSIS

R. A. Wynveen Jun. 1980 49 p refs

(Contract NAS2-9862)

(NASA-CR-166149; LSI-TR-341-4)

Avail: NTIS

HC A03/MF A01 CSCL 06K

The electrolyzer module was designed to produce 0.24 kg/d (0.53 lb/d) of breathable oxygen from the electrolysis of metabolic carbon dioxide and water vapor. The fractional capacity electrolyzer module is constructed from three electrochemical tube cells and contains only three critical seals. The module design illustrated an 84 percent reduction in the total number of seals for a one person capacity oxygen generating system based on the solid electrolyte carbon dioxide and water vapor electrolysis concept. The electrolyzer module was successfully endurance tested for 71 days. T.M.

N81-21771*# Lockheed Missiles and Space Co., Sunnyvale, Calif.

DEVELOPMENT OF A PREPROTOTYPE HYPERFILTRATION WASH WATER RECOVERY SUBSYSTEM Final Report

Jan. 1981 135 p refs

(Contract NAS9-15183)

(NASA-CR-160926; LMSC-D772059)

Avail: NTIS

HC A07/MF A01 CSCL 06K

The use of hyperfiltration as a mode of reclamation of waste water on board an extended mission spacecraft was investigated. Two basic approaches are considered with respect to hyperfiltration of wash water recovery. The initial approach involves the use of a hollow fiber permeator and a tubular module, operating at ambient temperature. In this system, relatively large doses of biocides are used to control microbial activity. Since biocides require a long contact time, and many have adverse dermatological effects as well as many interact with membrane material, a second approach is considered which involves operating at pasteurization temperature. R.C.T.

N81-21772*# Stanford Univ., Calif.

CONTROL OF A FLEXIBLE ROBOT ARM Final Report

Eric Schmitz and Robert Cannon Jan. 1980 28 p refs Prepared for JPL

(JPL-955636)

(NASA-CR-16416; JPL-9950-517)

Avail: NTIS

HC A03/MF A01 CSCL 05H

Exact equations of motion of an arm with known parameters were developed and analyzed preparatory to designing control systems for robotic manipulators. The design of an experimental one-link arm for testing control designs is presented. T.M.

N81-21773# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

AUTOMATIC PLANNING OF MANIPULATOR TRANSFER MOVEMENTS

Thomas Lozano-Perez Dec. 1980 56 p refs

(Contract N00014-77-C-0389)

(AD-A096118; AI-M-602) Avail: NTIS HC A04/MF A01 CSCL 13/9

This paper deals with the class of problems that involve finding where to place or how to move a solid object in the presence of obstacles. The solution to this class of problems is essential to the automatic planning of manipulator transfer movements, i.e., the motions to grasp a part and place it at some destination. This paper presents algorithms for planning manipulator paths that avoid collisions with objects in the workspace and for choosing safe grasp points on objects. These algorithms allow planning transfer movements for cartesian manipulators. The approach is based on a method of computing an explicit representation of the manipulator configurations that would bring about a collision. GRA

N81-21774# Rochester Univ., N. Y. School of Medicine and Dentistry.

BEHAVIOR AS A COMMON FOCUS OF TOXICOLOGY AND NUTRITION

Bernard Weiss 1980 28 p refs Presented at the Nutr. and Behavior Conf., Williamsburg, Va., 7 Mar. 1980 (Contract DE-AC02-76EV-03490; Grant NIMH-MH-11752) (UR-3490-1826; CONF-8003119-1) Avail: NTIS HC A03/MF A01

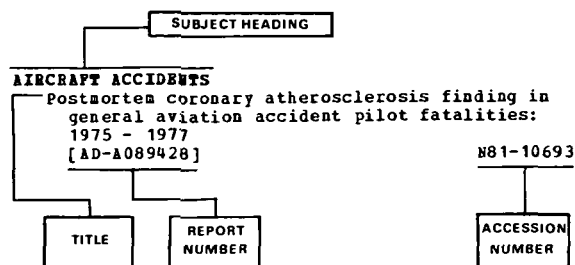
Behavior as an index of toxicity parallels its role as an index of nutritional impairment, just as toxicology and nutrition share other common themes. Intersections among the three disciplines arise because foodstuffs serve as one of the major routes of toxic exposure and also because food elements modify toxicity. With this perspective, the safety of our food supply is examined in the contexts of essential nutrients, toxins, toxic metals, manufactured contaminants, self-administered toxicants, and food additives. DOE

SUBJECT INDEX

AEROSPACE MEDICINE AND BIOLOGY /A Continuing Bibliography (Suppl. 221)

JULY 1981

Typical Subject Index Listing



The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, a title extension is added, separated from the title by three hyphens. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

A

ACCELERATION STRESSES (PHYSIOLOGY)

- The influence of +Gz on semicircular canal function
A81-30277
- Accelerations affecting man in stormy weather
N81-21750

ACCELERATION TOLERANCE

- Comparative analysis of human tolerance to prolonged loading at various gravitational gradients
A81-29319

ADAPTATION

- Human memorizing of emotionally significant and neutral information during adaptation to different climato-geographic conditions
A81-29322

ADRENAL GLAND

- Functional-morphological parallels of the hypothalamo-pituitary-adrenal system response reaction to long-term hypokinesia
[NASA-TM-76001] N81-20716
- State of cosmonauts' adrenohypophyseal system following orbital flights of different duration
N81-21740

ADRENOCORTICOTROPIN (ACTH)

- The role of ACTH and glucocorticoids in nonenzymatic fibrinolysis during immobilization stress in animals
[NASA-TM-76175] N81-20693
- ACTH-like peptides increase pain sensitivity and antagonize opiate analgesia
[NASA-TM-81254] N81-21731
- Stress antagonizes morphine-induced analgesia in rats
[NASA-TM-81282] N81-21732

AEROSPACE MEDICINE

- Change in the biomechanical properties in the bone of rats as a result of a 19-day space flight in the Kosmos-936 satellite
A81-28116
- Specialized physiological studies in support of manned space flight
[NASA-CR-160936] N81-20707
- USSR Report: Space Biology and Aerospace Medicine, volume 15, no. 1
[JPRS-77513] N81-21735
- Pharmacological agents for the prevention and treatment of motion sickness
N81-21736

- Results of studies of vestibular function and spatial perception in the crews of the first and second expeditions aboard Salyut-6 station
N81-21737
- Results of vectorcardiographic examinations during and after long term space flights aboard the Salyut-6-Soyuz orbital complex
N81-21738
- Conformity with human requirements of protein contained in the rations for crews of the Salyut-6 orbital station
N81-21739
- State of cosmonauts' adrenohypophyseal system following orbital flights of different duration
N81-21740
- Effects of space flights on lymphocyte blast transformation in cosmonauts' peripheral blood
N81-21741
- Changes in body mass of cosmonauts in the course of a 140-day space flight
N81-21742
- Effect of remaining briefly in orthostatic and antiorthostatic positions on man's tracking performance
N81-21745
- State of peripheral blood as related to altered diet and stress --- space flight feeding
N81-21746

AFTERIMAGES

- The perception of verticality and the frame of reference of the visual tilt aftereffect
A81-28899

AGE FACTOR

- A methodology for quantifying the effects of aging on perceptual-motor capability
A81-28675

AGING (BIOLOGY)

- A methodology for quantifying the effects of aging on perceptual-motor capability
A81-28675

AIR CONDITIONING

- Lightside atmospheric revitalization system
[NASA-CR-160897] N81-20731

AIR TRAFFIC CONTROL

- Investigations into the manual computer-aided piloting of a transport airplane along unconventional approach paths --- German thesis
A81-29695

AIRCRAFT CONTROL

- Pilot reaction to attitude gyro failure - A flight experiment
A81-29143

AIRCRAFT GUIDANCE

- Investigations into the manual computer-aided piloting of a transport airplane along unconventional approach paths --- German thesis
A81-29695

AIRCRAFT PILOTS

- Preventing body mass elevation in aviators
A81-27397
- Pilot reaction to attitude gyro failure - A flight experiment
A81-29143

ALGORITHMS

- Automatic planning of manipulator transfer movements
[AD-A096118] N81-21773

ALTITUDE ACCLIMATIZATION

- The role of thyroid hormones in thermoregulatory reactions during altitude adaptation
A81-27574

AMMONIA

- Response of selected microorganisms to experimental planetary environments
[NASA-CR-164064] N81-20733

ANALGESIA

SUBJECT INDEX

ANALGESIA

- ACTH-like peptides increase pain sensitivity and antagonize opiate analgesia
[NASA-TM-81254] N81-21731
- Stress antagonizes morphine-induced analgesia in rats
[NASA-TM-81282] N81-21732
- Regional analgesia by conduction anesthesia and reflex therapy in the acute recovery period following antiorthostatic hypokinesia N81-21749

ANESTHESIA

- Regional analgesia by conduction anesthesia and reflex therapy in the acute recovery period following antiorthostatic hypokinesia N81-21749

ANGIOGRAPHY

- Exercise-induced regional wall motion abnormalities on radionuclide angiography A81-29273

ANGULAR ACCELERATION

- The influence of +Gz on semicircular canal function A81-30277

APPROACH CONTROL

- Investigations into the manual computer-aided piloting of a transport airplane along unconventional approach paths --- German thesis A81-29695

AQUEOUS SOLUTIONS

- The effects of water and water-saline loads on orthostatic reactions in healthy people A81-29320

ARTERIES

- Hypoxia in the walls of large blood vessels N81-20706

ARTIFICIAL INTELLIGENCE

- Machine intelligence and robotics: Report of the NASA study group
[NASA-TM-82329] N81-21769

ASTRONAUT PERFORMANCE

- The design of cosmonaut living and working conditions --- Russian book A81-27537
- Eye torsion and the apparent horizon under head tilt and visual field rotation A81-28249
- Comparative analysis of human tolerance to prolonged loading at various gravitational gradients A81-29319
- The effects of water and water-saline loads on orthostatic reactions in healthy people A81-29320
- Effect of remaining briefly in orthostatic and antiorthostatic positions on man's tracking performance N81-21745

ASTRONAUT TRAINING

- Ground experiments for finding principles and working out methods for preventing adverse effects of weightlessness on the human organism
[NASA-TM-76465] N81-21760

ATHLETES

- The physiological effects of dehydration caused by sweat loss --- athletes
[NASA-TM-75893] N81-21761

ATMOSPHERIC PRESSURE

- Permissible rates of barometric pressure changes --- human tolerance in flight environment A81-27396
- Effect of hyperbaric nitrogen and oxygen atmosphere on activity of respiratory center N81-21758

ATTITUDE (INCLINATION)

- The perception of verticality and the frame of reference of the visual tilt aftereffect A81-28899
- Effect of remaining briefly in orthostatic and antiorthostatic positions on man's tracking performance N81-21745

ATTITUDE GYROS

- Pilot reaction to attitude gyro failure - A flight experiment A81-29143

AUDIOLOGY

- Circadian variation in the latency of brainstem responses and its relation to body temperature A81-30400

AUDITORY DEFECTS

- Meniere's disease: A surgeon's tactics
[NASA-TM-76398] N81-20719

AUDITORY PERCEPTION

- Meniere's disease: A surgeon's tactics
[NASA-TM-76398] N81-20719

AUDITORY SENSATION AREAS

- Meniere's disease: A surgeon's tactics
[NASA-TM-76398] N81-20719

AUTOMATA THEORY

- Machine intelligence and robotics: Report of the NASA study group
[NASA-TM-82329] N81-21769

AUTOMATIC CONTROL

- Automatic planning of manipulator transfer movements
[AD-A096118] N81-21773

B

BIBLIOGRAPHIES

- Effects of low-level radiation on biologic systems: A literature review --- bibliographies
[SAND-80-7143] N81-21733

BINOCULAR VISION

- A binocular contribution to the production of optokinetic nystagmus in normal and stereoblind subjects A81-28250

BIOASTRONAUTICS

- Life sciences: No place in the Sun --- NASA management N81-20978

USSR Report: Space Biology and Aerospace

- Medicine, volume 15, no. 1
[JPRS-77513] N81-21735

Pharmacological agents for the prevention and treatment of motion sickness

- N81-21736

Results of studies of vestibular function and spatial perception in the crews of the first and second expeditions aboard Salyut-6 station

- N81-21737

Results of vectorcardiographic examinations during and after long term space flights aboard the Salyut-6-Soyuz orbital complex

- N81-21738

Conformity with human requirements of protein contained in the rations for crews of the Salyut-6 orbital station

- N81-21739

State of cosmonauts' adrenohypophyseal system following orbital flights of different duration

- N81-21740

Effects of space flights on lymphocyte blast transformation in cosmonauts' peripheral blood

- N81-21741

Changes in body mass of cosmonauts in the course of a 140-day space flight

- N81-21742

Study of mass-inertia characteristics of human body segments during 6-month hypokinesia by the gamma scanning method

- N81-21743

Chemical composition of mineral component of human vertebrae and calcaneus after hypokinesia

- N81-21744

Effect of remaining briefly in orthostatic and antiorthostatic positions on man's tracking performance

- N81-21745

State of peripheral blood as related to altered diet and stress --- space flight feeding

- N81-21746

BIOCHEMISTRY

- Kinetic aspects of the chemical protection of proteins against the effects of radiation A81-28882

BIODYNAMICS

- Change in the biomechanical properties in the bone of rats as a result of a 19-day space flight in the Kosmos-936 satellite A81-28116

BIOLOGICAL EFFECTS

- Islet in weightlessness: Biological experiments on board COSMOS 1129 satellite
[NASA-TM-76396] N81-20692

Preliminary results of scientific research on biosatellite Kosmos-1129

- [NASA-TM-76287] N81-20700

- Design, construction and testing of a dc bioeffects test enclosure for small animals --- simulating the environment of high voltage dc transmission lines
[DOE/BA-10157/1] N81-20702
- Effects of low-level radiation on biologic systems: A literature review --- bibliographies [SAND-80-7143] N81-21733
- Biologic response to microwave/RF energy [UR-3490-1832] N81-21734
- Proceedings of the Workshop on Subchronic Toxicity Testing [ORNL/EIS-189] N81-21763
- BIOMETRICS**
Multifunctional transducer [NASA-CASE-NPO-14329-1] N81-20703
- BIONICS**
Control of a flexible robot arm [NASA-CR-16416] N81-21772
- BIOSATELLITES**
Islet in weightlessness: Biological experiments on board COSMOS 1129 satellite [NASA-TM-76396] N81-20692
- Ultrastructure of the myocardium of rats flown aboard the Cosmos-936 biosatellite N81-21755
- Phosphatase activity of rat antebrachial bones after flight aboard the Cosmos-936 biosatellite N81-21756
- BLOOD**
State of peripheral blood as related to altered diet and stress --- space flight feeding N81-21746
- BLOOD CIRCULATION**
Relic processes in the rat circulatory system during long-term adaptation to hypoxia N81-27575
- Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin [NASA-TM-76169] N81-20699
- BLOOD COAGULATION**
The role of ACTH and glucocorticoids in nonenzymatic fibrinolysis during immobilization stress in animals [NASA-TM-76175] N81-20693
- BLOOD FLOW**
Interactions between fatigue, muscle temperature, blood flow and the surface EMG N81-30279
- Noninvasive aortic bloodflow by Pulsed Doppler Echocardiography (PDE) compared to cardiac output by the direct Fick procedure N81-20709
- Beat by beat stroke volume assessment by PDE in upright and supine exercise N81-20710
- Changes in cardiac output and tibial artery flow during and after progressive LBNP N81-20712
- BLOOD PRESSURE**
The effects of water and water-saline loads on orthostatic reactions in healthy people N81-29320
- Constant pressure reservoir for organ perfusion N81-30278
- BLOOD VESSELS**
Changes in mast cells and in permeability of mesenteric microvessels under the effect of immobilization and electrostimulation [NASA-TM-75988] N81-20694
- Role of a decrease in body heat content in the thermoregulatory reaction of the concha auriculae vessels [NASA-TM-76370] N81-20717
- BLOOD VOLUME**
Instantaneous stroke volume by PDE during and after constant LBNP (-50 torr) N81-20711
- BODY FLUIDS**
The physiological effects of dehydration caused by sweat loss --- athletes [NASA-TM-75893] N81-21761
- BODY MEASUREMENT (BIOLOGY)**
Study of mass-inertia characteristics of human body segments during 6-month hypokinesia by the gamma scanning method N81-21743
- BODY TEMPERATURE**
Circadian variation in the latency of brainstem responses and its relation to body temperature N81-30400
- Role of a decrease in body heat content in the thermoregulatory reaction of the concha auriculae vessels [NASA-TM-76370] N81-20717
- BODY VOLUME (BIOLOGY)**
Study of mass-inertia characteristics of human body segments during 6-month hypokinesia by the gamma scanning method N81-21743
- BODY WEIGHT**
Preventing body mass elevation in aviators N81-27397
- Changes in body mass of cosmonauts in the course of a 140-day space flight N81-21742
- Study of mass-inertia characteristics of human body segments during 6-month hypokinesia by the gamma scanning method N81-21743
- BONE MARROW**
Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin [NASA-TM-76169] N81-20699
- BONE MINERAL CONTENT**
Phosphatase activity of rat antebrachial bones after flight aboard the Cosmos-936 biosatellite N81-21756
- Chemical composition of mineral component of rabbit bones as related to 30-day hypokinesia N81-21757
- BONES**
Change in the biomechanical properties in the bone of rats as a result of a 19-day space flight in the Kosmos-936 satellite N81-28116
- Effect of six-month hypokinesia in dogs on mineral component, reconstruction and mechanical properties of bone tissue [NASA-TM-76168] N81-20698
- Development of a new noninvasive method to determine the integrity of bone in vivo [NASA-CR-160922] N81-20722
- BRAIN STEM**
Circadian variation in the latency of brainstem responses and its relation to body temperature N81-30400
- BRIGHTNESS**
Human color discrimination during vestibular stimulation after exposure to bright light N81-21752
- C**
- CALCIUM**
Effect of six-month hypokinesia in dogs on mineral component, reconstruction and mechanical properties of bone tissue [NASA-TM-76168] N81-20698
- CALCIUM METABOLISM**
The effect of immobilization and 3 (beta-aminoethyl)-1, 2, 4 triazol on the calcium content in gastric tissues of guinea pigs during the formation of experimental ulcers [NASA-TM-75992] N81-20691
- CALORIC STIMULI**
Characteristics of vestibulosemory reactions studied by experimental caloric test [NASA-TM-76386] N81-20718
- CANCER**
Dual-mode microwave system to enhance early detection of cancer N81-28388
- CARCINOGENS**
Scientific rationale for the selection of toxicity testing methods: Human health assessment [ORNL/EIS-151] N81-21762
- CARDIAC VENTRICLES**
Activity of the right cardiac ventricle and metabolism in healthy persons during an orthostatic test after short term immobilization [NASA-TM-76519] N81-20726

CARDIOLOGY

SUBJECT INDEX

CARDIOLOGY

- Exercise-induced regional wall motion abnormalities on radionuclide angiography A81-29273
- Quantitative two dimensional echocardiography during bicycle exercise in normal subjects A81-29274

CARDIOVASCULAR SYSTEM

- The dynamics of psychophysiological and cardiovascular indicators during operator activity in the expectation and tracking regimes A81-29317
- Comparative analysis of human tolerance to prolonged loading at various gravitational gradients A81-29319
- The effects of water and water-saline loads on orthostatic reactions in healthy people A81-29320
- Beat by beat stroke volume assessment by PDE in upright and supine exercise N81-20710

CARTILAGE

- Experimental joint immobilization in guinea pigs. Effects on the knee joint [NASA-TM-76067] N81-20696

CATECHOLAMINE

- Change in energy expenditure and brain and adrenal content of catecholamines in rats during muscular loading and hypokinesia [NASA-TM-76148] N81-20697

CELLS (BIOLOGY)

- Changes in mast cells and in permeability of mesenteric microvessels under the effect of immobilization and electrostimulation [NASA-TM-75988] N81-20694
- Ultrastructure of the myocardium of rats flown aboard the Cosmos-936 biosatellite N81-21755

CENTRIFUGAL FORCE

- Comparative analysis of human tolerance to prolonged loading at various gravitational gradients A81-29319

CEREBRUM

- Objective appraisal of tolerance to ventriculography with various radiocontrast media (according to electronystagmography data) [NASA-TM-76340] N81-20721

CHEMICAL COMPOSITION

- Chemical composition of mineral component of human vertebrae and calcaneus after hypokinesia N81-21744
- Chemical composition of mineral component of rabbit bones as related to 30-day hypokinesia N81-21757

CHEMICAL TESTS

- Proceedings of the Workshop on Subchronic Toxicity Testing [ORNL/EIS-189] N81-21763

CHRONIC CONDITIONS

- Scientific rationale for the selection of toxicity testing methods: Human health assessment [ORNL/EIS-151] N81-21762

CIRCADIAN RHYTHMS

- The adjustment of the circadian rhythms of physiological functions during athletic training at various times of the day A81-29321
- Circadian variation in the latency of brainstem responses and its relation to body temperature A81-30400

CLASSIFICATIONS

- Orthostatic hypotension [NASA-TM-75889] N81-20728
- Teamwork in target Acquisition N81-20808

COGNITION

- Understanding understanding [AD-A096290] N81-21765

COLD TOLERANCE

- Pathogenesis of sudden death following water immersion (immersion syndrome) [NASA-TM-76542] N81-20723

COLLISION AVOIDANCE

- Automatic planning of manipulator transfer movements [AD-A096118] N81-21773

COLOR VISION

- Human color discrimination during vestibular stimulation after exposure to bright light N81-21752

COMPRESSIBILITY EFFECTS

- The viscoelastic behavior of the human intervertebral disc N81-20705

COMPUTER PROGRAMMING

- Automatic planning of manipulator transfer movements [AD-A096118] N81-21773

COMPUTER PROGRAMS

- Requirements definition and design guidelines for the man-machine interface A81-30232
- Visual detection model for structured targets (Penval Program) [AD-A096084] N81-21766

COMPUTERS

- Machine intelligence and robotics: Report of the NASA study group [NASA-TM-82329] N81-21769

CONTAMINANTS

- Behavior as a common focus of toxicology and nutrition [UR-3490-1826] N81-21774

CONTRACTION

- Study on contraction and relaxation of experimentally denervated and immobilized muscles: Comparison with dystrophic muscles [NASA-TM-76053] N81-20724

CONTROLLED ATMOSPHERES

- Lightside atmospheric revitalization system [NASA-CR-160897] N81-20731
- Effect of specific volume on formation of atmosphere in sealed compartments N81-21753

COORDINATION

- The coordination of eye and head movements during the gaze fixation reaction A81-29316

CORPUSCLES

- Electrophoretic cell separation using microspheres --- purification of lymphocytes [NASA-CR-164168] N81-21730

CORTICOSTEROIDS

- The role of ACTH and glucocorticoids in nonenzymatic fibrinolysis during immobilization stress in animals [NASA-TM-76175] N81-20693

COSMONAUTS

- The design of cosmonaut living and working conditions --- Russian book A81-27537
- Program for the medical examination (consultation) of cosmonauts [NASA-TM-76471] N81-20714

COSMOS SATELLITES

- Islet in weightlessness: Biological experiments on board COSMOS 1129 satellite [NASA-TM-76396] N81-20692
- Preliminary results of scientific research on biosatellite Kosmos-1129 [NASA-TM-76287] N81-20700

COSMOS 936 SATELLITE

- Change in the biomechanical properties in the bone of rats as a result of a 19-day space flight in the Kosmos-936 satellite A81-28116
- Ultrastructure of the myocardium of rats flown aboard the Cosmos-936 biosatellite N81-21755
- Phosphatase activity of rat antebrachial bones after flight aboard the Cosmos-936 biosatellite N81-21756

CRITICAL FLICKER FUSION

- Characteristics of the functional mobility of the visual analyzer A81-29315

D

DEATH

- Pathogenesis of sudden death following water immersion (immersion syndrome) [NASA-TM-76542] N81-20723

DEHYDRATION

The physiological effects of dehydration caused by sweat loss --- athletes
[NASA-TM-75893] N81-21761

DEOXYRIBONUCLEIC ACID

The origin of genetic information
A81-28612

DETECTION

Visual detection model for structured targets
(Penval Program)
[AD-A096084] N81-21766

DIETS

State of peripheral blood as related to altered diet and stress --- space flight feeding
N81-21746

DIFFERENTIAL EQUATIONS

Control of walking machines --- Russian book
A81-27533

DIGESTIVE SYSTEM

Efficacy of alimentary factors in the recovery period following long-term antiorthostatic hypokinesia
N81-21747

DISEASES

Study on contraction and relaxation of experimentally denervated and immobilized muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724

DOPPLER EFFECT

Noninvasive aortic bloodflow by Pulsed Doppler Echocardiography (PDE) compared to cardiac output by the direct Fick procedure
N81-20709

Beat by beat stroke volume assessment by PDE in upright and supine exercise
N81-20710

Instantaneous stroke volume by PDE during and after constant LBHP (-50 torr)
N81-20711

DYNAMIC CONTROL

Control of walking machines --- Russian book
A81-27533

E**EAR**

Role of a decrease in body heat content in the thermoregulatory reaction of the concha auricular vessels
[NASA-TM-76370] N81-20717

Meniere's disease: A surgeon's tactics
[NASA-TM-76398] N81-20719

ECHOCARDIOGRAPHY

Quantitative two dimensional echocardiography during bicycle exercise in normal subjects
A81-29274

Noninvasive aortic bloodflow by Pulsed Doppler Echocardiography (PDE) compared to cardiac output by the direct Fick procedure
N81-20709

Beat by beat stroke volume assessment by PDE in upright and supine exercise
N81-20710

Instantaneous stroke volume by PDE during and after constant LBHP (-50 torr)
N81-20711

EDUCATION

Some university experiences of aircraft simulator research
A81-27890

ELECTROCARDIOGRAPHY

The evaluation of the state of stress of an operator according to electrocardiogram statistical characteristics
A81-29318

Results of vectorcardiographic examinations during and after long term space flights aboard the Salyut-6-Soyuz orbital complex
N81-21738

ELECTROLYSIS

Fractional capacity electrolyzer development for CO₂ and H₂O electrolysis
[NASA-CR-166149] N81-21770

ELECTROLYTIC CELLS

Fractional capacity electrolyzer development for CO₂ and H₂O electrolysis
[NASA-CR-166149] N81-21770

ELECTROMAGNETIC FIELDS

Development of a new noninvasive method to determine the integrity of bone in vivo
[NASA-CR-160922] N81-20722

ELECTRONIOGRAPHY

Interactions between fatigue, muscle temperature, blood flow and the surface EMG
A81-30279

ELECTRONYSTAGMOGRAPHY

Importance of photoelectronystagmography for clinical study of the vestibular function
[NASA-TM-76404] N81-20713

Objective appraisal of tolerance to ventriculography with various radiocontrast media (according to electronystagmography data)
[NASA-TM-76340] N81-20721

ELECTROPHORESIS

Electrophoretic cell separation using microspheres --- purification of lymphocytes
[NASA-CR-164168] N81-21730

ELECTROPHYSIOLOGY

Constant pressure reservoir for organ perfusion
A81-30278

Results of vectorcardiographic examinations during and after long term space flights aboard the Salyut-6-Soyuz orbital complex
N81-21738

ENCLOSURES

Design, construction and testing of a dc bioeffects test enclosure for small animals --- simulating the environment of high voltage dc transmission lines
[DOE/EA-10157/1] N81-20702

ENDOCRINOLOGY

State of cosmonauts' adrenohypophyseal system following orbital flights of different duration
N81-21740

ENVIRONMENT SIMULATORS

Design, construction and testing of a dc bioeffects test enclosure for small animals --- simulating the environment of high voltage dc transmission lines
[DOE/EA-10157/1] N81-20702

ENZYME ACTIVITY

Phosphatase activity of rat antebrachial bones after flight aboard the Cosmos-936 biosatellite
N81-21756

ENZYMES

The origin of genetic information
A81-28612

The enzyme spectrum of the small intestine with hypodynamia under conditions of high temperature
[NASA-TM-76150] N81-20727

ENZYMOLGY

Activity of certain enzymes in subcellular fractions of rat liver after flight on Cosmos 1129 biosatellite
[NASA-TM-76472] N81-20701

EQUATIONS OF MOTION

Control of a flexible robot arm
[NASA-CR-16416] N81-21772

ETHANE

Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl
[LA-8572-MS] N81-20732

EXAMINATION

Development of a new noninvasive method to determine the integrity of bone in vivo
[NASA-CR-160922] N81-20722

EXERCISE PHYSIOLOGY

Exercise-induced regional wall motion abnormalities on radionuclide angiography
A81-29273

Quantitative two dimensional echocardiography during bicycle exercise in normal subjects
A81-29274

The adjustment of the circadian rhythms of physiological functions during athletic training at various times of the day
A81-29321

Constant pressure reservoir for organ perfusion
A81-30278

Interactions between fatigue, muscle temperature, blood flow and the surface EMG
A81-30279

EXHAUSTION

SUBJECT INDEX

EXHAUSTION

- Functional-morphological parallels of the hypothalamo-pituitary-adrenal system response reaction to long-term hypokinesia [NASA-TM-76001] N81-20716
- EXOBIOLOGY**
- Islet in weightlessness: Biological experiments on board COSMOS 1129 satellite [NASA-TM-76396] N81-20692
- Life sciences: No place in the Sun --- NASA management N81-20978
- USSR Report: Space Biology and Aerospace Medicine, volume 15, no. 1 [JPES-77513] N81-21735
- Pharmacological agents for the prevention and treatment of motion sickness N81-21736
- EXPOSURE**
- Proceedings of the Workshop on Subchronic Toxicity Testing [ORNL/EIS-189] N81-21763
- EYE MOVEMENTS**
- Eye torsion and the apparent horizon under head tilt and visual field rotation A81-28249
- Characteristics of the functional mobility of the visual analyzer A81-29315
- The coordination of eye and head movements during the gaze fixation reaction A81-29316
- F**
- FIBRIN**
- The role of ACTH and glucocorticoids in nonenzymatic fibrinolysis during immobilization stress in animals [NASA-TM-76175] N81-20693
- FIELD OF VIEW**
- Eye torsion and the apparent horizon under head tilt and visual field rotation A81-28249
- FILTRATION**
- Development of a preprototype hyperfiltration wash water recovery subsystem [NASA-CR-160926] N81-21771
- FINITE DIFFERENCE THEORY**
- Control of walking machines --- Russian book A81-27533
- FLEXIBILITY**
- Control of a flexible robot arm [NASA-CR-16416] N81-21772
- FLIGHT ALTITUDE**
- Influence of the flight altitude and limitation of the field of view on the visibility of targets on the ground and the maximum visibility flight altitude [ESA-TT-654] N81-21768
- FLIGHT CREWS**
- Nuclear survivability/vulnerability of aircrews: An experimental approach [AD-A095501] N81-20729
- FLIGHT SIMULATION**
- Some university experiences of aircraft simulator research A81-27890
- Behavioural evaluations of simulators - Academic and practical issues A81-27891
- FLIGHT SIMULATORS**
- Some university experiences of aircraft simulator research A81-27890
- FLIGHT STRESS (BIOLOGY)**
- The influence of +Gz on semicircular canal function A81-30277
- Constant pressure reservoir for organ perfusion A81-30278
- FOOD**
- Behavior as a common focus of toxicology and nutrition [UR-3490-1826] N81-21774
- FRANCE**
- Orthostatic hypotension [NASA-TM-75889] N81-20728

G

GAMMA RAYS

- Nuclear survivability/vulnerability of aircrews: An experimental approach [AD-A095501] N81-20729
- Study of mass-inertia characteristics of human body segments during 6-month hypokinesia by the gamma scanning method N81-21743

GARMENTS

- Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl [LA-8572-MS] N81-20732

GASTROINTESTINAL SYSTEM

- The enzyme spectrum of the small intestine with hypodynamia under conditions of high temperature [NASA-TM-76150] N81-20727

GENETIC CODE

- The origin of genetic information A81-28612

GRATINGS (SPECTRA)

- Contrast sensitivity difference between spatial sine-wave and square-wave gratings of the human visual system A81-28633

GRAVITATIONAL EFFECTS

- Comparative analysis of human tolerance to prolonged loading at various gravitational gradients A81-29319
- The influence of +Gz on semicircular canal function A81-30277

GROWTH

- Change in energy expenditure and brain and adrenal content of catecholamines in rats during muscular loading and hypokinesia [NASA-TM-76148] N81-20697

GUINEA PIGS

- The effect of immobilization and 3 (beta-aminoethyl)-1, 2, 4 triazol on the calcium content in gastric tissues of guinea pigs during the formation of experimental ulcers [NASA-TM-75992] N81-20691
- Experimental joint immobilization in guinea pigs. Effects on the knee joint [NASA-TM-76067] N81-20696

H

HALOGENATION

- Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl [LA-8572-MS] N81-20732

HEAD MOVEMENT

- The coordination of eye and head movements during the gaze fixation reaction A81-29316

HEALTH PHYSICS

- Dependence of electromagnetic energy deposition upon angle of incidence for an inhomogeneous block model of man under plane-wave irradiation A81-28387

- Effects of low-level radiation on biologic systems: A literature review --- bibliographies [SAND-80-7143] N81-21733

HEART DISEASES

- Exercise-induced regional wall motion abnormalities on radionuclide angiography A81-29273

HEART FUNCTION

- Quantitative two dimensional echocardiography during bicycle exercise in normal subjects A81-29274

- Noninvasive aortic bloodflow by Pulsed Doppler Echocardiography (PDE) compared to cardiac output by the direct Fick procedure N81-20709

- Beat by beat stroke volume assessment by PDE in upright and supine exercise N81-20710

- Changes in cardiac output and tibial artery flow during and after progressive LBNP N81-20712

SUBJECT INDEX

HYPOXIA

- Activity of the right cardiac ventricle and metabolism in healthy persons during an orthostatic test after short term immobilization [NASA-TM-76519] N81-20726
- HEART RATE**
Specialized physiological studies in support of manned space flight [NASA-CR-160936] N81-20707
Analysis of heart rate variability as an estimate of pilot workload in human engineering research [ESA-TT-653] N81-21764
- HEMODYNAMICS**
Orthostatic hypotension [NASA-TM-75889] N81-20728
- HIGH PRESSURE**
Effect of hyperbaric nitrogen and oxygen atmosphere on activity of respiratory center N81-21758
- HIGH TEMPERATURE ENVIRONMENTS**
The enzyme spectrum of the small intestine with hypodynamia under conditions of high temperature [NASA-TM-76150] N81-20727
- HIGH VOLTAGES**
Design, construction and testing of a dc bioeffects test enclosure for small animals --- simulating the environment of high voltage dc transmission lines [DOE/RA-10157/1] N81-20702
- HORIZON**
Eye torsion and the apparent horizon under head tilt and visual field rotation A81-28249
- HUMAN BEHAVIOR**
Behavior as a common focus of toxicology and nutrition [UR-3490-1826] N81-21774
- HUMAN BODY**
Dependence of electromagnetic energy deposition upon angle of incidence for an inhomogeneous block model of man under plane-wave irradiation A81-28387
The physiological effects of dehydration caused by sweat loss --- athletes [NASA-TM-75893] N81-21761
- HUMAN FACTORS ENGINEERING**
Requirements definition and design guidelines for the man-machine interface A81-30232
Analysis of heart rate variability as an estimate of pilot workload in human engineering research [ESA-TT-653] N81-21764
- HUMAN PATHOLOGY**
Scientific rationale for the selection of toxicity testing methods: Human health assessment [ORNL/EIS-151] N81-21762
- HUMAN PERFORMANCE**
A local mechanism for differential velocity detection A81-28248
A methodology for quantifying the effects of aging on perceptual-motor capability A81-28675
The perception of verticality and the frame of reference of the visual tilt aftereffect A81-28899
Velocity gradients and relative depth perception A81-28900
Characteristics of the functional mobility of the visual analyzer A81-29315
The adjustment of the circadian rhythms of physiological functions during athletic training at various times of the day A81-29321
Knowledge compilation: Mechanisms for the automatization of cognitive skills [AD-A096117] N81-21767
- HUMAN REACTIONS**
Permissible rates of barometric pressure changes --- human tolerance in flight environment A81-27396
Pilot reaction to attitude gyro failure - A flight experiment A81-29143
The coordination of eye and head movements during the gaze fixation reaction A81-29316
- Behavior as a common focus of toxicology and nutrition [UR-3490-1826] N81-21774
- HUMAN TOLERANCES**
Permissible rates of barometric pressure changes --- human tolerance in flight environment A81-27396
Comparative analysis of human tolerance to prolonged loading at various gravitational gradients A81-29319
- HYDROGEN**
Response of selected microorganisms to experimental planetary environments [NASA-CR-164064] N81-20733
- HYDROGEN SULFIDE**
Response of selected microorganisms to experimental planetary environments [NASA-CR-164064] N81-20733
- HYPODYNAMIA**
Effect of inaction on function of fast and slow muscle spindles [NASA-TM-76374] N81-20720
The enzyme spectrum of the small intestine with hypodynamia under conditions of high temperature [NASA-TM-76150] N81-20727
- HYPOKINESIA**
Change in energy expenditure and brain and adrenal content of catecholamines in rats during muscular loading and hypokinesia [NASA-TM-76148] N81-20697
Effect of six-month hypokinesia in dogs on mineral component, reconstruction and mechanical properties of bone tissue [NASA-TM-76168] N81-20698
Functional-morphological parallels of the hypothalamo-pituitary-adrenal system response reaction to long-term hypokinesia [NASA-TM-76001] N81-20716
The functional status of the human vestibular analyzer following 56 days in an aqueous immersion medium [NASA-TM-75888] N81-20725
Study of mass-inertia characteristics of human body segments during 6-month hypokinesia by the gamma scanning method N81-21743
Chemical composition of mineral component of human vertebrae and calcaneus after hypokinesia N81-21744
Efficacy of alimentary factors in the recovery period following long-term antiorthostatic hypokinesia N81-21747
Regional analgesia by conduction anesthesia and reflex therapy in the acute recovery period following antiorthostatic hypokinesia N81-21749
Chemical composition of mineral component of rabbit bones as related to 30-day hypokinesia N81-21757
- HYPOTENSION**
Orthostatic hypotension [NASA-TM-75889] N81-20728
- HYPOTHALAMUS**
Functional-morphological parallels of the hypothalamo-pituitary-adrenal system response reaction to long-term hypokinesia [NASA-TM-76001] N81-20716
- HYPOXIA**
The role of thyroid hormones in thermoregulatory reactions during altitude adaptation A81-27574
Relic processes in the rat circulatory system during long-term adaptation to hypoxia A81-27575
Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin [NASA-TM-76169] N81-20699
Hypoxia in the walls of large blood vessels N81-20706

I

- IMAGE CONTRAST**
Contrast sensitivity difference between spatial sine-wave and square-wave gratings of the human visual system
A81-28633
- IMMOBILIZATION**
The effect of immobilization and 3 (beta-aminoethyl)-1, 2, 4 triazol on the calcium content in gastric tissues of guinea pigs during the formation of experimental ulcers
[NASA-TM-75992] N81-20691
Changes in mast cells and in permeability of mesenteric microvessels under the effect of immobilization and electrostimulation
[NASA-TM-75988] N81-20694
Morphological changes in neurons of the hind limb reflex arc during long term immobilization
[NASA-TM-75939] N81-20695
Experimental joint immobilization in guinea pigs. Effects on the knee joint
[NASA-TM-76067] N81-20696
Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin
[NASA-TM-76169] N81-20699
Activity of the right cardiac ventricle and metabolism in healthy persons during an orthostatic test after short term immobilization
[NASA-TM-76519] N81-20726
- IMMUNITY**
Effects of space flights on lymphocyte blast transformation in cosmonauts' peripheral blood
N81-21741
- IMPACT ACCELERATION**
Computational aspects of incorporating auxiliary information into an impact acceleration injury prediction model
[AD-A095299] N81-20730
- IMPACT PREDICTION**
Computational aspects of incorporating auxiliary information into an impact acceleration injury prediction model
[AD-A095299] N81-20730
- IMPLANTED ELECTRODES (BIOLOGY)**
Surgical access to separate branches of the cat vestibular nerve
[NASA-TM-76478] N81-20715
- INCIDENCE**
Dependence of electromagnetic energy deposition upon angle of incidence for an inhomogeneous block model of man under plane-wave irradiation
A81-28387
- INFORMATION SYSTEMS**
Requirements definition and design guidelines for the man-machine interface
A81-30232
- INJURIES**
Computational aspects of incorporating auxiliary information into an impact acceleration injury prediction model
[AD-A095299] N81-20730
- INTERVERTEBRAL DISKS**
The viscoelastic behavior of the human intervertebral disc
N81-20705
- INTESTINES**
The enzyme spectrum of the small intestine with hypodysplasia under conditions of high temperature
[NASA-TM-76150] N81-20727
- INTRAVEHICULAR ACTIVITY**
The design of cosmonaut living and working conditions --- Russian book
A81-27537

K

- KNEE (ANATOMY)**
Experimental joint immobilization in guinea pigs. Effects on the knee joint
[NASA-TM-76067] N81-20696
- KNOWLEDGE**
Understanding understanding
[AD-A096290] N81-21765
Knowledge compilation: Mechanisms for the automatization of cognitive skills
[AD-A096117] N81-21767

L

- LABYRINTH**
Characteristics of vestibulosensory reactions studied by experimental caloric test
[NASA-TM-76386] N81-20718
- LEARNING**
Understanding understanding
[AD-A096290] N81-21765
Knowledge compilation: Mechanisms for the automatization of cognitive skills
[AD-A096117] N81-21767
- LIFE SCIENCES**
Life sciences: No place in the Sun --- NASA management
N81-20978
- LIFE SUPPORT SYSTEMS**
Lightside atmospheric revitalization system
[NASA-CR-160897] N81-20731
Fractional capacity electrolyzer development for CO2 and H2O electrolysis
[NASA-CR-166149] N81-21770
- LIGHT (VISIBLE RADIATION)**
Human color discrimination during vestibular stimulation after exposure to bright light
N81-21752
- LIMBS (ANATOMY)**
Morphological changes in neurons of the hind limb reflex arc during long term immobilization
[NASA-TM-75939] N81-20695
- LIPIDS**
Preventing body mass elevation in aviators
A81-27397
- LIVER**
Activity of certain enzymes in subcellular fractions of rat liver after flight on Cosmos 1129 biosatellite
[NASA-TM-76472] N81-20701
- LONG TERM EFFECTS**
Relic processes in the rat circulatory system during long-term adaptation to hypoxia
A81-27575
Proceedings of the Workshop on Subchronic Toxicity Testing
[ONRL/EIS-189] N81-21763
- LOWER BODY NEGATIVE PRESSURE**
Specialized physiological studies in support of manned space flight
[NASA-CR-160936] N81-20707
Tolerance of Lower Body Negative Pressure (LBNP) in endurance runners, weightlifters, swimmers and nonathletes
N81-20708
Instantaneous stroke volume by PDE during and after constant LBNP (-50 torr)
N81-20711
Changes in cardiac output and tibial artery flow during and after progressive LBNP
N81-20712
- LYMPHOCYTES**
Electrophoretic cell separation using microspheres --- purification of lymphocytes
[NASA-CR-164168] N81-21730
Effects of space flights on lymphocyte blast transformation in cosmonauts' peripheral blood
N81-21741

M

- MAN MACHINE SYSTEMS**
Requirements definition and design guidelines for the man-machine interface
A81-30232
Teamwork in target Acquisition
N81-20808
- MANIPULATORS**
Control of a flexible robot arm
[NASA-CR-16416] N81-21772
Automatic planning of manipulator transfer movements
[AD-A096118] N81-21773
- MANUAL CONTROL**
Investigations into the manual computer-aided piloting of a transport airplane along unconventional approach paths --- German thesis
A81-29695

SUBJECT INDEX

NYLON (TRADEMARK)

- MATHEMATICAL LOGIC**
Knowledge compilation: Mechanisms for the automatization of cognitive skills
[AD-A096117] N81-21767
- MATHEMATICAL MODELS**
Control of walking machines --- Russian book
A81-27533
Visual detection model for structured targets (Penval Program)
[AD-A096084] N81-21766
- MEDICAL ELECTRONICS**
Dual-mode microwave system to enhance early detection of cancer
A81-28388
Constant pressure reservoir for organ perfusion
A81-30278
- MEMORY**
Human memorizing of emotionally significant and neutral information during adaptation to different climato-geographic conditions
A81-29322
Knowledge compilation: Mechanisms for the automatization of cognitive skills
[AD-A096117] N81-21767
- MENTAL PERFORMANCE**
Human memorizing of emotionally significant and neutral information during adaptation to different climato-geographic conditions
A81-29322
- METHANE**
Response of selected microorganisms to experimental planetary environments
[NASA-CR-164064] N81-20733
- MICROBIOLOGY**
Response of selected microorganisms to experimental planetary environments
[NASA-CR-164064] N81-20733
- MICROORGANISMS**
Response of selected microorganisms to experimental planetary environments
[NASA-CR-164064] N81-20733
- MICROWAVE RADIOMETERS**
Dual-mode microwave system to enhance early detection of cancer
A81-28388
- MICROWAVES**
Biologic response to microwave/RF energy
[UR-3490-1832] N81-21734
- MINERAL METABOLISM**
Chemical composition of mineral component of human vertebrae and calcaneus after hypokinesia
A81-21744
- MODULES**
Spacelab flight simulated by two monkeys at CERMA
[NASA-TM-76390] N81-21729
- MOLECULAR BIOLOGY**
The origin of genetic information
A81-28612
- MONKEYS**
Spacelab flight simulated by two monkeys at CERMA
[NASA-TM-76390] N81-21729
- MORPHINE**
Stress antagonizes morphine-induced analgesia in rats
[NASA-TM-81282] N81-21732
- MORPHOLOGY**
Morphological changes in neurons of the hind limb reflex arc during long term immobilization
[NASA-TM-75939] N81-20695
Functional-morphological parallels of the hypothalamo-pituitary-adrenal system response reaction to long-term hypokinesia
[NASA-TM-76001] N81-20716
- MOTION PERCEPTION**
Visual illusions arising during the perception of moving images
A81-27573
A local mechanism for differential velocity detection
A81-28248
Eye torsion and the apparent horizon under head tilt and visual field rotation
A81-28249
Velocity gradients and relative depth perception
A81-28900
- MOTION SICKNESS**
Pharmacological agents for the prevention and treatment of motion sickness
N81-21736
- Study of human vestibular reactions to simulated periodic ship rolling
N81-21751
- MOTION SICKNESS DRUGS**
Pharmacological agents for the prevention and treatment of motion sickness
N81-21736
- MUSCLES**
Change in energy expenditure and brain and adrenal content of catecholamines in rats during muscular loading and hypokinesia
[NASA-TM-76148] N81-20697
Multifunctional transducer
[NASA-CASE-NPO-14329-1] N81-20703
Effect of inaction on function of fast and slow muscle spindles
[NASA-TM-76374] N81-20720
Study on contraction and relaxation of experimentally denervated and immobilized muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724
- MUSCULAR FATIGUE**
Interactions between fatigue, muscle temperature, blood flow and the surface EMG
A81-30279
- MUSCULAR FUNCTION**
Study on contraction and relaxation of experimentally denervated and immobilized muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724
- MUSCULOSKELETAL SYSTEM**
Experimental joint immobilization in guinea pigs. Effects on the knee joint
[NASA-TM-76067] N81-20696
Effect of space flight factors on ultrastructure of skeletal muscles
N81-21754
- MYOCARDIUM**
Ultrastructure of the myocardium of rats flown aboard the Cosmos-936 biosatellite
N81-21755

N

- NASA PROGRAMS**
Life sciences: No place in the Sun --- NASA management
N81-20978
- NERVES**
Surgical access to separate branches of the cat vestibular nerve
[NASA-TM-76478] N81-20715
- NEURONS**
Morphological changes in neurons of the hind limb reflex arc during long term immobilization
[NASA-TM-75939] N81-20695
- NITROGEN**
Effect of hyperbaric nitrogen and oxygen atmosphere on activity of respiratory center
N81-21758
- NONDESTRUCTIVE TESTS**
Development of a new noninvasive method to determine the integrity of bone in vivo
[NASA-CR-160922] N81-20722
- NUCLEAR VULNERABILITY**
Nuclear survivability/vulnerability of aircrews: An experimental approach
[AD-A095501] N81-20729
- NUMERICAL CONTROL**
Investigations into the manual computer-aided piloting of a transport airplane along unconventional approach paths --- German thesis
A81-29695
- NUTRITION**
Preventing body mass elevation in aviators
A81-27397
Behavior as a common focus of toxicology and nutrition
[UR-3490-1826] N81-21774
- NUTRITIONAL REQUIREMENTS**
Conformity with human requirements of protein contained in the rations for crews of the Salyut-6 orbital station
N81-21739
- NYLON (TRADEMARK)**
Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl
[LA-8572-MS] N81-20732

NYSTAGMUS

NYSTAGMUS

A binocular contribution to the production of optokinetic nystagmus in normal and stereoblind subjects
A81-28250

O

OCULOMOTOR NERVES

Objective appraisal of tolerance to ventriculography with various radiocontrast media (according to electronystagmography data)
[NASA-TM-76340] N81-20721

OPERATIONS RESEARCH

Machine intelligence and robotics: Report of the NASA study group
[NASA-TM-82329] N81-21769

OPERATOR PERFORMANCE

The dynamics of psychophysiological and cardiovascular indicators during operator activity in the expectation and tracking regimes
A81-29317

The evaluation of the state of stress of an operator according to electrocardiogram statistical characteristics
A81-29318

Teamwork in target Acquisition
N81-20808

OPTICAL ILLUSION

Visual illusions arising during the perception of moving images
A81-27573

ORTHOSTATIC TOLERANCE

The effects of water and water-saline loads on orthostatic reactions in healthy people
A81-29320

Activity of the right cardiac ventricle and metabolism in healthy persons during an orthostatic test after short term immobilization
[NASA-TM-76519] N81-20726

Efficacy of alimentary factors in the recovery period following long-term antiorthostatic hypokinesia
N81-21747

Regional analgesia by conduction anesthesia and reflex therapy in the acute recovery period following antiorthostatic hypokinesia
N81-21749

OTOLITH ORGANS

The influence of +Gz on semicircular canal function
A81-30277

OTOLOGY

Surgical access to separate branches of the cat vestibular nerve
[NASA-TM-76478] N81-20715

OXYGEN

Effect of hyperbaric nitrogen and oxygen atmosphere on activity of respiratory center
N81-21758

OXYGEN METABOLISM

Activity of certain enzymes in subcellular fractions of rat liver after flight on Cosmos 1129 biosatellite
[NASA-TM-76472] N81-20701

OXYGEN PRODUCTION

Fractional capacity electrolyzer development for CO2 and H2O electrolysis
[NASA-CR-166149] N81-21770

OXYGEN SUPPLY EQUIPMENT

Fractional capacity electrolyzer development for CO2 and H2O electrolysis
[NASA-CR-166149] N81-21770

OXYGEN TENSION

Hypoxia in the walls of large blood vessels
N81-20706

P

PAIN SENSITIVITY

ACTH-like peptides increase pain sensitivity and antagonize opiate analgesia
[NASA-TM-81254] N81-21731

PATHOGENESIS

Pathogenesis of sudden death following water immersion (immersion syndrome)
[NASA-TM-76542] N81-20723

SUBJECT INDEX

Study on contraction and relaxation of experimentally denervated and immobilized muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724

PATHOLOGY

Functional-morphological parallels of the hypothalamo-pituitary-adrenal system response reaction to long-term hypokinesia
[NASA-TM-76001] N81-20716

PEPTIDES

ACTH-like peptides increase pain sensitivity and antagonize opiate analgesia
[NASA-TM-81254] N81-21731

PERCEPTION

Understanding understanding
[AD-A096290] N81-21765

Knowledge compilation: Mechanisms for the automatization of cognitive skills
[AD-A096117] N81-21767

PERMEABILITY

Changes in mast cells and in permeability of mesenteric microvessels under the effect of immobilization and electrostimulation
[NASA-TM-75988] N81-20694

PERMEATING

Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl
[LA-6572-MS] N81-20732

PERSONNEL SELECTION

Program for the medical examination (consultation) of cosmonauts
[NASA-TM-76471] N81-20714

PERSPIRATION

The physiological effects of dehydration caused by sweat loss --- athletes
[NASA-TM-75893] N81-21761

PHOTOELECTRIC EFFECT

Importance of photoelectronystagmography for clinical study of the vestibular function
[NASA-TM-76404] N81-20713

PHOTOINTERPRETATION

Teamwork in target Acquisition
N81-20808

PHYSICAL EXAMINATIONS

Program for the medical examination (consultation) of cosmonauts
[NASA-TM-76471] N81-20714

PHYSICAL EXERCISE

The adjustment of the circadian rhythms of physiological functions during athletic training at various times of the day
A81-29321

Effect of level of motor activity on aerobic efficiency in healthy man
N81-21748

PHYSICAL FITNESS

Tolerance of Lower Body Negative Pressure (LBNP) in endurance runners, weightlifters, swimmers and nonathletes
N81-20708

PHYSIOLOGICAL EFFECTS

The effect of immobilization and 3 (beta-aminoethyl)-1, 2, 4 triazol on the calcium content in gastric tissues of guinea pigs during the formation of experimental ulcers
[NASA-TM-75992] N81-20691

Effect of six-month hypokinesia in dogs on mineral component, reconstruction and mechanical properties of bone tissue
[NASA-TM-76168] N81-20698

Preliminary results of scientific research on biosatellite Kosmos-1129
[NASA-TM-76287] N81-20700

Effect of inaction on function of fast and slow muscle spindles
[NASA-TM-76374] N81-20720

Efficacy of alimentary factors in the recovery period following long-term antiorthostatic hypokinesia
N81-21747

Effect of level of motor activity on aerobic efficiency in healthy man
N81-21748

Effect of space flight factors on ultrastructure of skeletal muscles
N81-21754

- Ground experiments for finding principles and working out methods for preventing adverse effects of weightlessness on the human organism [NASA-TN-76465] N81-21760
- The physiological effects of dehydration caused by sweat loss --- athletes [NASA-TN-75893] N81-21761
- PHYSIOLOGICAL FACTORS**
- Spacelab flight simulated by two monkeys at CERNA [NASA-TN-76390] N81-21729
- PHYSIOLOGICAL RESPONSES**
- Permissible rates of barometric pressure changes --- human tolerance in flight environment A81-27396
- Visual illusions arising during the perception of moving images A81-27573
- The role of thyroid hormones in thermoregulatory reactions during altitude adaptation A81-27574
- Belic processes in the rat circulatory system during long-term adaptation to hypoxia A81-27575
- The dynamics of psychophysiological and cardiovascular indicators during operator activity in the expectation and tracking regimes A81-29317
- The adjustment of the circadian rhythms of physiological functions during athletic training at various times of the day A81-29321
- The influence of +Gz on semicircular canal function A81-30277
- Circadian variation in the latency of brainstem responses and its relation to body temperature A81-30400
- Activity of certain enzymes in subcellular fractions of rat liver after flight on Cosmos 1129 biosatellite [NASA-TN-76472] N81-20701
- Pathogenesis of sudden death following water immersion (immersion syndrome) [NASA-TN-76542] N81-20723
- The functional status of the human vestibular analyzer following 56 days in an aqueous immersion medium [NASA-TN-75888] N81-20725
- PHYSIOLOGICAL TESTS**
- Visual illusions arising during the perception of moving images A81-27573
- Program for the medical examination (consultation) of cosmonauts [NASA-TN-76471] N81-20714
- PHYSIOLOGY**
- Orthostatic hypotension [NASA-TN-75889] N81-20728
- PILOT PERFORMANCE**
- Pilot reaction to attitude gyro failure - A flight experiment A81-29143
- Analysis of heart rate variability as an estimate of pilot workload in human engineering research [ESA-TT-653] N81-21764
- PILOT TRAINING**
- Some university experiences of aircraft simulator research A81-27890
- Behavioural evaluations of simulators - Academic and practical issues A81-27891
- PITUITARY GLAND**
- Functional-morphological parallels of the hypothalamo-pituitary-adrenal system response reaction to long-term hypokinesia [NASA-TN-76001] N81-20716
- State of cosmonauts' adrenohypophyseal system following orbital flights of different duration N81-21740
- PLASMA WAVES**
- Dependence of electromagnetic energy deposition upon angle of incidence for an inhomogeneous block model of man under plane-wave irradiation A81-28387
- POLYCHLORINATED BIPHENYLS**
- Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl [LA-8572-MS] N81-20732
- PRESSURE GRADIENTS**
- Permissible rates of barometric pressure changes --- human tolerance in flight environment A81-27396
- PROJECT MANAGEMENT**
- Life sciences: No place in the Sun --- NASA management N81-20978
- PROTECTIVE CLOTHING**
- Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl [LA-8572-MS] N81-20732
- PROTECTIVE COATINGS**
- Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl [LA-8572-MS] N81-20732
- PROTEINS**
- Kinetic aspects of the chemical protection of proteins against the effects of radiation A81-28882
- Conformity with human requirements of protein contained in the rations for crews of the Salyut-6 orbital station N81-21739
- PSYCHOLOGICAL FACTORS**
- Behavioural evaluations of simulators - Academic and practical issues A81-27891
- PSYCHOMETRICS**
- A methodology for quantifying the effects of aging on perceptual-motor capability A81-28675
- PUBLIC HEALTH**
- Biologic response to microwave/RF energy [UR-3490-1832] N81-21734
- Scientific rationale for the selection of toxicity testing methods: Human health assessment [ORNL/EIS-151] N81-21762
- PURIFICATION**
- Electrophoretic cell separation using microspheres --- purification of lymphocytes [NASA-CR-164168] N81-21730

R

- RABBITS**
- Morphological changes in neurons of the hind limb reflex arc during long term immobilization [NASA-TN-75939] N81-20695
- RADIATION CHEMISTRY**
- Kinetic aspects of the chemical protection of proteins against the effects of radiation A81-28882
- RADIATION DOSAGE**
- Dependence of electromagnetic energy deposition upon angle of incidence for an inhomogeneous block model of man under plane-wave irradiation A81-28387
- RADIATION EFFECTS**
- Nuclear survivability/vulnerability of aircrews: An experimental approach [AD-A095501] N81-20729
- Effects of low-level radiation on biologic systems: A literature review --- bibliographies [SAND-80-7143] N81-21733
- RADIATION HAZARDS**
- Biologic response to microwave/RF energy [UR-3490-1832] N81-21734
- RADIATION PROTECTION**
- Kinetic aspects of the chemical protection of proteins against the effects of radiation A81-28882
- RADIO FREQUENCY HEATING**
- Dual-mode microwave system to enhance early detection of cancer A81-28388
- RADIO TRANSMITTERS**
- Dual-mode microwave system to enhance early detection of cancer A81-28388
- RADIO WAVES**
- Dependence of electromagnetic energy deposition upon angle of incidence for an inhomogeneous block model of man under plane-wave irradiation A81-28387
- Biologic response to microwave/RF energy [UR-3490-1832] N81-21734

RADIOGRAPHY

SUBJECT INDEX

RADIOGRAPHY

Objective appraisal of tolerance to
ventriculography with various radiocontrast
media (according to electronystagmography data)
[NASA-TM-76340] N81-20721

RATS

Changes in mast cells and in permeability of
mesenteric microvessels under the effect of
immobilization and electrostimulation
[NASA-TM-75988] N81-20694
Activity of certain enzymes in subcellular
fractions of rat liver after flight on Cosmos
1129 biosatellite
[NASA-TM-76472] N81-20701
Stress antagonizes morphine-induced analgesia in
rats
[NASA-TM-81282] N81-21732

REACTION KINETICS

Kinetic aspects of the chemical protection of
proteins against the effects of radiation
A81-28882

REACTION TIME

Nuclear survivability/vulnerability of aircrews:
An experimental approach
[AD-A095501] N81-20729

REDUCTION (CHEMISTRY)

Fractional capacity electrolyzer development for
CO₂ and H₂O electrolysis
[NASA-CR-166149] N81-21770

REFLEXES

Regional analgesia by conduction anesthesia and
reflex therapy in the acute recovery period
following antiorthostatic hypokinesia
N81-21749

RELAXATION (PHYSIOLOGY)

The viscoelastic behavior of the human
intervertebral disc
N81-20705

Study on contraction and relaxation of
experimentally denervated and immobilized
muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724

RESPIRATORY PHYSIOLOGY

Effect of hyperbaric nitrogen and oxygen
atmosphere on activity of respiratory center
N81-21758

RESPIRATORY RATE

Effect of level of motor activity on aerobic
efficiency in healthy man
N81-21748

RESPONSES

Response of selected microorganisms to
experimental planetary environments
[NASA-CR-164064] N81-20733

RETINAL IMAGES

Contrast sensitivity difference between spatial
sine-wave and square-wave gratings of the human
visual system
A81-28633

Velocity gradients and relative depth perception
A81-28900

RIBONUCLEIC ACIDS

The origin of genetic information
A81-28612

ROBOTS

Machine intelligence and robotics: Report of the
NASA study group
[NASA-TM-82329] N81-21769
Control of a flexible robot arm
[NASA-CR-16416] N81-21772

ROLLING MOMENTS

Study of human vestibular reactions to simulated
periodic ship rolling
N81-21751

ROTATION

Eye torsion and the apparent horizon under head
tilt and visual field rotation
A81-28249

RUBBER

Permeation of protective garment material by
liquid halogenated ethanes and a polychlorinated
biphenyl
[LA-8572-MS] N81-20732

S

SEMICIRCULAR CANALS

The influence of +Gz on semicircular canal function
A81-30277

Study of human vestibular reactions to simulated
periodic ship rolling
N81-21751

SENSORIMOTOR PERFORMANCE

A methodology for quantifying the effects of aging
on perceptual-motor capability
A81-28675

Characteristics of the functional mobility of the
visual analyzer
A81-29315

SENSORY PERCEPTION

Characteristics of vestibulosensory reactions
studied by experimental caloric test
[NASA-TM-76386] N81-20718

SPACE FLIGHT

Preliminary results of scientific research on
biosatellite Kosmos-1129
[NASA-TM-76287] N81-20700

SPACE FLIGHT FEEDING

Conformity with human requirements of protein
contained in the rations for crews of the
Salyut-6 orbital station
N81-21739

State of peripheral blood as related to altered
diet and stress --- space flight feeding
N81-21746

SPACE FLIGHT STRESS

Change in the biomechanical properties in the bone
of rats as a result of a 19-day space flight in
the Kosmos-936 satellite
A81-28116

Activity of certain enzymes in subcellular
fractions of rat liver after flight on Cosmos
1129 biosatellite
[NASA-TM-76472] N81-20701

Results of vectorcardiographic examinations during
and after long term space flights aboard the
Salyut-6-Soyuz orbital complex
N81-21738

State of cosmonauts' adrenohypophyseal system
following orbital flights of different duration
N81-21740

Effects of space flights on lymphocyte blast
transformation in cosmonauts' peripheral blood
N81-21741

State of peripheral blood as related to altered
diet and stress --- space flight feeding
N81-21746

Effect of space flight factors on ultrastructure
of skeletal muscles
N81-21754

SPACE PERCEPTION

Velocity gradients and relative depth perception
A81-28900

Results of studies of vestibular function and
spatial perception in the crews of the first and
second expeditions aboard Salyut-6 station
N81-21737

SPACE RATIONS

Conformity with human requirements of protein
contained in the rations for crews of the
Salyut-6 orbital station
N81-21739

SPACEBORNE EXPERIMENTS

Islet in weightlessness: Biological experiments
on board COSMOS 1129 satellite
[NASA-TM-76396] N81-20692

SPACECRAFT CONTAMINATION

Effect of specific volume on formation of
atmosphere in sealed compartments
N81-21753

SPACECRAFT DESIGN

The design of cosmonaut living and working
conditions --- Russian book
A81-27537

SPACECRAFT ENVIRONMENTS

The design of cosmonaut living and working
conditions --- Russian book
A81-27537

Lightside atmospheric revitalization system
[NASA-CR-160897] N81-20731

Spacelab flight simulated by two monkeys at CERNA
[NASA-TM-76390] N81-21729

Effect of specific volume on formation of
atmosphere in sealed compartments
N81-21753

SPATIAL FILTERING

Contrast sensitivity difference between spatial sine-wave and square-wave gratings of the human visual system

A81-28633

SPLINE

Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin [NASA-TM-76169]

N81-20699

SPORES

Response of selected microorganisms to experimental planetary environments [NASA-CR-164064]

N81-20733

STATISTICAL ANALYSIS

The evaluation of the state of stress of an operator according to electrocardiogram statistical characteristics

A81-29318

STEREOSCOPIC VISION

A binocular contribution to the production of optokinetic nystagmus in normal and stereoblind subjects

A81-28250

STIMULANT

Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin [NASA-TM-76169]

N81-20699

STIMULATION

Changes in mast cells and in permeability of mesenteric microvessels under the effect of immobilization and electrostimulation [NASA-TM-75988]

N81-20694

STORMS (METEOROLOGY)

Accelerations affecting man in stormy weather

N81-21750

STRAIN GAGES

Development of a new noninvasive method to determine the integrity of bone in vivo [NASA-CR-160922]

N81-20722

STRESS (PHYSIOLOGY)

The evaluation of the state of stress of an operator according to electrocardiogram statistical characteristics

A81-29318

The role of ACTH and glucocorticoids in nonenzymatic fibrinolysis during immobilization stress in animals [NASA-TM-76175]

N81-20693

Stress antagonizes morphine-induced analgesia in rats [NASA-TM-81282]

N81-21732

STRUCTURAL DESIGN

Design, construction and testing of a dc bioeffects test enclosure for small animals --- simulating the environment of high voltage dc transmission lines [DOE/EA-10157/1]

N81-20702

STRUCTURAL STABILITY

Control of a flexible robot arm [NASA-CR-16416]

N81-21772

SUBMERGING

Pathogenesis of sudden death following water immersion (immersion syndrome) [NASA-TM-76542]

N81-20723

SUPINE POSITION

Beat by beat stroke volume assessment by PDE in upright and supine exercise

N81-20710

SURGERY

Surgical access to separate branches of the cat vestibular nerve [NASA-TM-76478]

N81-20715

Meniere's disease: A surgeon's tactics [NASA-TM-76398]

N81-20719

SYSTEM FAILURES

Pilot reaction to attitude gyro failure - A flight experiment

A81-29143

SYSTEMS ANALYSIS

Requirements definition and design guidelines for the man-machine interface

A81-30232

SYSTOLE

Noninvasive aortic bloodflow by Pulsed Doppler Echocardiography (PDE) compared to cardiac output by the direct Fick procedure

N81-20709

T

TARGET ACQUISITION

Teamwork in target Acquisition

N81-20808

TARGET RECOGNITION

Visual detection model for structured targets (Penval Program)

[AD-A096084]

N81-21766

Influence of the flight altitude and limitation of the field of view on the visibility of targets on the ground and the maximum visibility flight altitude [ESA-TT-654]

N81-21768

TEAMS

Teamwork in target Acquisition

N81-20808

TENDONS

Effect of inaction on function of fast and slow muscle spindles [NASA-TM-76374]

N81-20720

THERMOREGULATION

The role of thyroid hormones in thermoregulatory reactions during altitude adaptation

A81-27574

Role of a decrease in body heat content in the thermoregulatory reaction of the concha auriculae vessels [NASA-TM-76370]

N81-20717

THRESHOLDS (PERCEPTION)

A local mechanism for differential velocity detection

A81-28248

THYRUS GLAND

Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin [NASA-TM-76169]

N81-20699

THYROID GLAND

The role of thyroid hormones in thermoregulatory reactions during altitude adaptation

A81-27574

TISSUES (BIOLOGY)

The effect of immobilization and 3 (beta-aminoethyl)-1, 2, 4 triazol on the calcium content in gastric tissues of guinea pigs during the formation of experimental ulcers [NASA-TM-75992]

N81-20691

Multifunctional transducer [NASA-CASE-NPO-14329-1]

N81-20703

Hypoxia in the walls of large blood vessels

N81-20706

TOLERANCES (PHYSIOLOGY)

Specialized physiological studies in support of manned space flight [NASA-CR-160936]

N81-20707

Tolerance of Lower Body Negative Pressure (LBNP) in endurance runners, weightlifters, swimmers and nonathletes

N81-20708

TOXICITY

Scientific rationale for the selection of toxicity testing methods: Human health assessment [ORNL/EIS-151]

N81-21762

Proceedings of the Workshop on Subchronic Toxicity Testing [ORNL/EIS-189]

N81-21763

TOXICOLOGY

Behavior as a common focus of toxicology and nutrition [UR-3490-1826]

N81-21774

TRACKING (POSITION)

Effect of remaining briefly in orthostatic and antiorthostatic positions on man's tracking performance

N81-21745

TRAINING ANALYSIS

Behavioural evaluations of simulators - Academic and practical issues

A81-27891

TRAINING SIMULATORS

Behavioural evaluations of simulators - Academic and practical issues

A81-27891

TRANSDUCERS

Multifunctional transducer [NASA-CASE-NPO-14329-1]

N81-20703

TRANSMISSION LINES

SUBJECT INDEX

TRANSMISSION LINES

Design, construction and testing of a dc bioeffects test enclosure for small animals --- simulating the environment of high voltage dc transmission lines
[DOE/BA-10157/1] N81-20702

TRANSPORT AIRCRAFT

Investigations into the manual computer-aided piloting of a transport airplane along unconventional approach paths --- German thesis
A81-29695

U

U.S.S.R.

Change in energy expenditure and brain and adrenal content of catecholamines in rats during muscular loading and hypokinesia
[NASA-TM-76148] N81-20697

Effect of six-month hypokinesia in dogs on mineral component, reconstruction and mechanical properties of bone tissue
[NASA-TM-76168] N81-20698

Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin
[NASA-TM-76169] N81-20699

Preliminary results of scientific research on biosatellite Kosmos-1129
[NASA-TM-76287] N81-20700

Effect of inaction on function of fast and slow muscle spindles
[NASA-TM-76374] N81-20720

USER REQUIREMENTS

Requirements definition and design guidelines for the man-machine interface
A81-30232

V

VARIATIONS

Analysis of heart rate variability as an estimate of pilot workload in human engineering research
[ESA-TT-653] N81-21764

VASOCONSTRICTION

Role of a decrease in body heat content in the thermoregulatory reaction of the concha auricular vessels
[NASA-TM-76370] N81-20717

VECTORCARDIOGRAPHY

Results of vectorcardiographic examinations during and after long term space flights aboard the Salyut-6-Soyuz orbital complex
N81-21738

VERTEBRAE

Chemical composition of mineral component of human vertebrae and calcaneus after hypokinesia
N81-21744

VERTICAL PERCEPTION

The perception of verticality and the frame of reference of the visual tilt aftereffect
A81-28899

Characteristics of vestibulosensory reactions studied by experimental caloric test
[NASA-TM-76386] N81-20718

VESTIBULAR NYSTAGMUS

Importance of photoelectronystagmography for clinical study of the vestibular function
[NASA-TM-76404] N81-20713

Objective appraisal of tolerance to ventriculography with various radiocontrast media (according to electronystagmography data)
[NASA-TM-76340] N81-20721

VESTIBULAR TESTS

Characteristics of vestibulosensory reactions studied by experimental caloric test
[NASA-TM-76386] N81-20718

The functional status of the human vestibular analyzer following 56 days in an aqueous immersion medium
[NASA-TM-75888] N81-20725

Results of studies of vestibular function and spatial perception in the crews of the first and second expeditions aboard Salyut-6 station
N81-21737

VESTIBULES

Surgical access to separate branches of the cat vestibular nerve
[NASA-TM-76478] N81-20715

Results of studies of vestibular function and spatial perception in the crews of the first and second expeditions aboard Salyut-6 station
N81-21737

Human color discrimination during vestibular stimulation after exposure to bright light
N81-21752

VISCOELASTICITY

The viscoelastic behavior of the human intervertebral disc
N81-20705

VISIBILITY

Influence of the flight altitude and limitation of the field of view on the visibility of targets on the ground and the maximum visibility flight altitude
[ESA-TT-654] N81-21768

VISUAL ACUITY

A local mechanism for differential velocity detection
A81-28248

VISUAL DISCRIMINATION

Human color discrimination during vestibular stimulation after exposure to bright light
N81-21752

VISUAL PERCEPTION

Visual illusions arising during the perception of moving images
A81-27573

A local mechanism for differential velocity detection
A81-28248

Eye torsion and the apparent horizon under head tilt and visual field rotation
A81-28249

A binocular contribution to the production of optokinetic nystagmus in normal and stereoblind subjects
A81-28250

Contrast sensitivity difference between spatial sine-wave and square-wave gratings of the human visual system
A81-28633

The perception of verticality and the frame of reference of the visual tilt aftereffect
A81-28899

Characteristics of the functional mobility of the visual analyzer
A81-29315

The coordination of eye and head movements during the gaze fixation reaction
A81-29316

Visual detection model for structured targets (Penval-Program)
[AD-A096084] N81-21766

VISUAL STIMULI

The coordination of eye and head movements during the gaze fixation reaction
A81-29316

W

WALKING MACHINES

Control of walking machines --- Russian book
A81-27533

WATER RECLAMATION

Development of a preprototype hyperfiltration wash water recovery subsystem
[NASA-CR-160926] N81-21771

WATER TREATMENT

Development of a preprototype hyperfiltration wash water recovery subsystem
[NASA-CR-160926] N81-21771

WATER VEHICLES

Study of human vestibular reactions to simulated periodic ship rolling
N81-21751

WEATHER

Accelerations affecting man in stormy weather
N81-21750

WEIGHT REDUCTION

Preventing body mass elevation in aviators
A81-27397

WEIGHTLESSNESS

Change in the biomechanical properties in the bone of rats as a result of a 19-day space flight in the Kosmos-936 satellite
A81-28116

SUBJECT INDEX

WORKLOADS (PSYCHOPHYSIOLOGY)

Islet in weightlessness: Biological experiments
on board COSMOS 1129 satellite
[NASA-TM-76396] N81-20692

Ground experiments for finding principles and
working out methods for preventing adverse
effects of weightlessness on the human organism
[NASA-TM-76465] N81-21760

WEIGHTLESSNESS SIMULATION

Ground experiments for finding principles and
working out methods for preventing adverse
effects of weightlessness on the human organism
[NASA-TM-76465] N81-21760

WORDS (LANGUAGE)

Human memorizing of emotionally significant and
neutral information during adaptation to
different climato-geographic conditions
A81-29322

WORKLOADS (PSYCHOPHYSIOLOGY)

The design of cosmonaut living and working
conditions --- Russian book
A81-27537

The dynamics of psychophysiological and
cardiovascular indicators during operator
activity in the expectation and tracking regimes
A81-29317

The evaluation of the state of stress of an
operator according to electrocardiogram
statistical characteristics
A81-29318

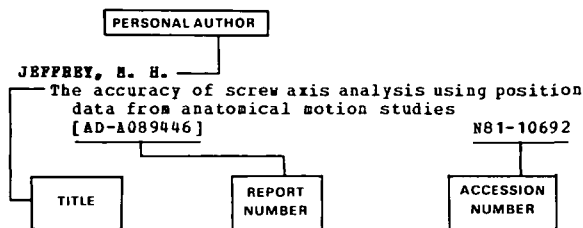
Analysis of heart rate variability as an estimate
of pilot workload in human engineering research
[ESA-TT-653] N81-21764

PERSONAL AUTHOR INDEX

AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Suppl. 221)

JULY 1981

Typical Personal Author Index Listing



The title of the document is used to provide the user with a brief description of the subject matter. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

A

- ABDUSATTAROV, A.**
The enzyme spectrum of the small intestine with hypodynamia under conditions of high temperature [NASA-TM-76150] N81-20727
- ALAVERDIAN, A. M.**
Relic processes in the rat circulatory system during long-term adaptation to hypoxia N81-27575
- ALEKSEYEV, V. M.**
Results of studies of vestibular function and spatial perception in the crews of the first and second expeditions aboard Salyut-6 station N81-21737
- ALLES, W.**
Investigations into the manual computer-aided piloting of a transport airplane along unconventional approach paths N81-29695
- ANDERSEN, G. J.**
Velocity gradients and relative depth perception N81-28900
- ANDERSON, J. B.**
Knowledge compilation: Mechanisms for the automatization of cognitive skills [AD-A096117] N81-21767
- ARUTYUNYAN, R. S.**
Effect of inaction on function of fast and slow muscle spindles [NASA-TM-76374] N81-20720
- AVAKYAN, M. M.**
Regional analgesia by conduction anesthesia and reflex therapy in the acute recovery period following antiorthostatic hypokinesia N81-21749
- AYZIKOV, G. S.**
Surgical access to separate branches of the cat vestibular nerve [NASA-TM-76478] N81-20715

B

- BABUSHKIN, V. A.**
Accelerations affecting man in stormy weather N81-21750
- BALAKHOVSKII, I. S.**
The effects of water and water-saline loads on orthostatic reactions in healthy people N81-29320

- BALAKHOVSKII, I. S.**
State of cosmonauts' adrenohypophyseal system following orbital flights of different duration N81-21740
- BANKS, M. S.**
The perception of verticality and the frame of reference of the visual tilt aftereffect N81-28899
- BARNIN, V. A.**
The coordination of eye and head movements during the gaze fixation reaction N81-29316
- BARNATSKII, V. M.**
Accelerations affecting man in stormy weather N81-21750
- BAUER, J. A., JR.**
A binocular contribution to the production of optokinetic nystagmus in normal and stereoblind subjects N81-28250
- BAZHENOV, I. I.**
The role of thyroid hormones in thermoregulatory reactions during altitude adaptation N81-27574
- BELOUSOVA, O. I.**
Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin [NASA-TM-76169] N81-20699
- BEST, T. L.**
Effects of low-level radiation on biologic systems: A literature review [SAND-80-7143] N81-21733
- BLAGOVESHCHENSKAYA, N. S.**
Objective appraisal of tolerance to ventriculography with various radiocontrast media (according to electronystagmography data) [NASA-TM-76340] N81-20721
- BOGOMOLOV, V. V.**
Regional analgesia by conduction anesthesia and reflex therapy in the acute recovery period following antiorthostatic hypokinesia N81-21749
- BOBODULINA, I. I.**
Conformity with human requirements of protein contained in the rations for crews of the Salyut-6 orbital station N81-21739
- BRAUNSTEIN, M. L.**
Velocity gradients and relative depth perception N81-28900
- BRESLAV, I. S.**
Effect of hyperbaric nitrogen and oxygen atmosphere on activity of respiratory center N81-21758
- BUERK, D. G.**
Hypoxia in the walls of large blood vessels N81-20706
- BUHRING, M.**
Pathogenesis of sudden death following water immersion (immersion syndrome) [NASA-TM-76542] N81-20723
- BYCHKOV, V. P.**
Conformity with human requirements of protein contained in the rations for crews of the Salyut-6 orbital station N81-21739
- Efficacy of alimentary factors in the recovery period following long-term antiorthostatic hypokinesia** N81-21747

C

- CANNON, R.
Control of a flexible robot arm
[NASA-CR-16416] N81-21772
- CARR, K. L.
Dual-mode microwave system to enhance early
detection of cancer N81-28388
- CASPER, R. A.
The viscoelastic behavior of the human
intervertebral disc N81-20705
- CHAPLEO, A. Q.
Some university experiences of aircraft simulator
research N81-27890
- CHATTERJEE, I.
Dependence of electromagnetic energy deposition
upon angle of incidence for an inhomogeneous
block model of man under plane-wave irradiation
[NASA-TM-76519] N81-28387
- CHEBNUKHA, V. M.
Permissible rates of barometric pressure changes
N81-27396
- CHESTUKHIN, V. V.
Activity of the right cardiac ventricle and
metabolism in healthy persons during an
orthostatic test after short term immobilization
[NASA-TM-76519] N81-20726
- CHUBAROV, G. V.
Regional analgesia by conduction anesthesia and
reflex therapy in the acute recovery period
following antiorthostatic hypokinesia N81-21749
- COCCIA, M. R.
The influence of +Gz on semicircular canal function
N81-36277
- COLLING, A. K.
Lightside atmospheric revitalization system
[NASA-CR-160897] N81-20731
- CONN, R. V.
Scientific rationale for the selection of toxicity
testing methods: Human health assessment
[ORNL/EIS-151] N81-21762
- CORDAY, E.
Quantitative two dimensional echocardiography
during bicycle exercise in normal subjects
N81-29274
- CORDTS, R. E.
Nuclear survivability/vulnerability of aircrews:
An experimental approach
[AD-A095501] N81-20729
- CULLER, V. H.
Multifunctional transducer
[NASA-CASE-NPO-14329-1] N81-20703
- CUSHMAN, R. J.
Lightside atmospheric revitalization system
[NASA-CR-160897] N81-20731

D

- DAUGHERTY, M. W.
Scientific rationale for the selection of toxicity
testing methods: Human health assessment
[ORNL/EIS-151] N81-21762
- DEY, D.
Teamwork in target Acquisition N81-20808
- DIACHKOV, V. A.
The adjustment of the circadian rhythms of
physiological functions during athletic training
at various times of the day N81-29321
- DIDENKO, I. Y.
Chemical composition of mineral component of human
vertebrae and calcaneus after hypokinesia
N81-21744
- Chemical composition of mineral component of
rabbit bones as related to 30-day hypokinesia
N81-21757
- DLUSSKAYA, I. G.
The effects of water and water-saline loads on
orthostatic reactions in healthy people
N81-29320

- DLUSSKAYA, I. G.
State of cosmonauts' adrenohypophyseal system
following orbital flights of different duration
N81-21740
- DONCHIN, E.
Circadian variation in the latency of brainstem
responses and its relation to body temperature
N81-30400
- DRURY, J. S.
Scientific rationale for the selection of toxicity
testing methods: Human health assessment
[ORNL/EIS-151] N81-21762

E

- EIGEN, M.
The origin of genetic information N81-28612
- EL-NAHDI, A. M.
Dual-mode microwave system to enhance early
detection of cancer N81-28388
- ENSHINGER, J. T.
Scientific rationale for the selection of toxicity
testing methods: Human health assessment
[ORNL/EIS-151] N81-21762

F

- FEDOTOVA, M. I.
Comparison of early reactions of the blood system
in rats to immobilization, the action of hypoxia
and the administration of erythropoietin
[NASA-TM-76169] N81-20699
- FELDSSTEIN, C.
Multifunctional transducer
[NASA-CASE-NPO-14329-1] N81-20703
- FOSTER, T. L.
Response of selected microorganisms to
experimental planetary environments
[NASA-CR-164064] N81-20733
- FRAZIER, M. J.
Design, construction and testing of a dc
bioeffects test enclosure for small animals
[DOE/EA-10157/1] N81-20702
- FRIER, W. D.
Visual detection model for structured targets
(Penval Program)
[AD-A096084] N81-21766

G

- GANDHI, O. P.
Dependence of electromagnetic energy deposition
upon angle of incidence for an inhomogeneous
block model of man under plane-wave irradiation
N81-28387
- GARDNER, W.
The origin of genetic information N81-28612
- GEORGIYEVSKIY, V. S.
Activity of the right cardiac ventricle and
metabolism in healthy persons during an
orthostatic test after short term immobilization
[NASA-TM-76519] N81-20726
- GOLUBCHIKOVA, Z. A.
Results of vectorcardiographic examinations during
and after long term space flights aboard the
Salyut-6-Soyuz orbital complex N81-21738
- GORIZONTOV, P. D.
Comparison of early reactions of the blood system
in rats to immobilization, the action of hypoxia
and the administration of erythropoietin
[NASA-TM-76169] N81-20699
- GORIZONTOVA, M. P.
Changes in mast cells and in permeability of
mesenteric microvessels under the effect of
immobilization and electrostimulation
[NASA-TM-75988] N81-20694
- GRECHISHKIN, L. L.
The effect of immobilization and 3
(beta-aminoethyl)-1, 2, 4 triazol on the calcium
content in gastric tissues of guinea pigs during
the formation of experimental ulcers
[NASA-TM-75992] N81-20691

- GREGORYEV, A. I.
Ground experiments for finding principles and working out methods for preventing adverse effects of weightlessness on the human organism
[NASA-TM-76465] N81-21760
- GRIGORYEV, A. I.
State of cosmonauts' adrenohypophyseal system following orbital flights of different duration
N81-21740
- GRISHINA, K. V.
Effect of specific volume on formation of atmosphere in sealed compartments
N81-21753
- GUDIN, V. I.
Comparison of early reactions of the blood system in rats to immobilization, the action of hypoxia and the administration of erythropoietin
[NASA-TM-76169] N81-20699
- GURETT, P.
Quantitative two dimensional echocardiography during bicycle exercise in normal subjects
A81-29274
- GUROVSKII, N. N.
The design of cosmonaut living and working conditions
A81-27537
- GUSEV, V. N.
Study of human vestibular reactions to simulated periodic ship rolling
N81-21751

H

- HAGMAN, M. J.
Dependence of electromagnetic energy deposition upon angle of incidence for an inhomogeneous block model of man under plane-wave irradiation
A81-28387
- HAMMILL, H. B.
Visual detection model for structured targets (Penval Program)
[AD-A096084] N81-21766
- HANPETER, D.
Constant pressure reservoir for organ perfusion
A81-30278
- HARDY, K. A.
Nuclear survivability/vulnerability of aircrews: An experimental approach
[AD-A095501] N81-20729
- HAZAMA, B.
Study on contraction and relaxation of experimentally denervated and immobilized muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724
- HECHT, H. S.
Exercise-induced regional wall motion abnormalities on radionuclide angiography
A81-29273
- HELD, B.
Eye torsion and the apparent horizon under head tilt and visual field rotation
A81-28249
- A binocular contribution to the production of optokinetic nystagmus in normal and stereoblind subjects
A81-28250
- HEYBACH, J. P.
ACTH-like peptides increase pain sensitivity and antagonize opiate analgesia
[NASA-TM-81254] N81-21731
- Stress antagonizes morphine-induced analgesia in rats
[NASA-TM-81282] N81-21732
- HODITSCHKE, B.
Effects of low-level radiation on biologic systems: A literature review
[SAND-80-7143] N81-21733
- HOFFMANN, H. E.
Influence of the flight altitude and limitation of the field of view on the visibility of targets on the ground and the maximum visibility flight altitude
[ESA-TT-654] N81-21768
- HOLT, D.
Quantitative two dimensional echocardiography during bicycle exercise in normal subjects
A81-29274

- HOPKINS, J. M.
Exercise-induced regional wall motion abnormalities on radionuclide angiography
A81-29273
- HULTMAN, M. M.
Lightside atmospheric revitalization system
[NASA-CR-160897] N81-20731
- IDE, Y.
Study on contraction and relaxation of experimentally denervated and immobilized muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724
- ILIUCHENOK, B. IU.
Human memorizing of emotionally significant and neutral information during adaptation to different climato-geographic conditions
A81-29322
- ISOMO, H.
Contrast sensitivity difference between spatial sine-wave and square-wave gratings of the human visual system
A81-28633
- ISRAEL, S.
The physiological effects of dehydration caused by sweat loss
[NASA-TM-75893] N81-21761

K

- KAKURIN, L. I.
Ground experiments for finding principles and working out methods for preventing adverse effects of weightlessness on the human organism
[NASA-TM-76465] N81-21760
- KALINICHENKO, V. V.
Results of vectorcardiographic examinations during and after long term space flights aboard the Salyut-6-Soyuz orbital complex
N81-21738
- KAPRANOV, V. Z.
Characteristics of vestibulosensory reactions studied by experimental caloric test
[NASA-TM-76386] N81-20718
- KARAKOZOV, K. G.
Importance of photoelectronystagmography for clinical study of the vestibular function
[NASA-TM-76404] N81-20713
- KASTAN, I. I.
Changes in body mass of cosmonauts in the course of a 140-day space flight
N81-21742
- KATKOV, V. I.
Activity of the right cardiac ventricle and metabolism in healthy persons during an orthostatic test after short term immobilization
[NASA-TM-76519] N81-20726
- KHECHINASHVILI, S. N.
Importance of photoelectronystagmography for clinical study of the vestibular function
[NASA-TM-76404] N81-20713
- KHITROV, N. K.
Relic processes in the rat circulatory system during long-term adaptation to hypoxia
A81-27575
- KHLOPINA, S. P.
Changes in body mass of cosmonauts in the course of a 140-day space flight
N81-21742
- KHODOROVA, N. A.
Change in energy expenditure and brain and adrenal content of catecholamines in rats during muscular loading and hypokinesia
[NASA-TM-76148] N81-20697
- KISELEV, N. K.
State of cosmonauts' adrenohypophyseal system following orbital flights of different duration
N81-21740
- KISLYAKOV, V. A.
Study of human vestibular reactions to simulated periodic ship rolling
N81-21751
- KLYUYEVA, N. Z.
Effect of hyperbaric nitrogen and oxygen atmosphere on activity of respiratory center
N81-21758

- KORNILOVA, L. N.**
Results of studies of vestibular function and spatial perception in the crews of the first and second expeditions aboard Salyut-6 station
N81-21737
- KORZHENYANTS, V. A.**
Effect of six-month hypokinesia in dogs on mineral component, reconstruction and mechanical properties of bone tissue
[NASA-TM-76168] N81-20698
- KOSMOLINSKII, P. P.**
The design of cosmonaut living and working conditions
A81-27537
- KOZLOVSKAIA, I. B.**
The coordination of eye and head movements during the gaze fixation reaction
A81-29316
- KREIDICH, IU. V.**
The coordination of eye and head movements during the gaze fixation reaction
A81-29316
- KUDRYASHOV, B. A.**
The role of ACTH and glucocorticoids in nonenzymatic fibrinolysis during immobilization stress in animals
[NASA-TM-76175] N81-20693
- KUDRYASHOVA, Z. M.**
Regional analgesia by conduction anesthesia and reflex therapy in the acute recovery period following antiorthostatic hypokinesia
N81-21749
Human color discrimination during vestibular stimulation after exposure to bright light
N81-21752
- KUZNETSOVA, T. I.**
Effect of specific volume on formation of atmosphere in sealed compartments
N81-21753
- L**
- LANGEREUX, P.**
Spacelab flight simulated by two monkeys at CERNA
[NASA-TM-76390] N81-21729
- LAPAEV, E. V.**
Permissible rates of barometric pressure changes
A81-27396
- LARIN, V. B.**
Control of walking machines
A81-27533
- LENSKIY, V. V.**
Regional analgesia by conduction anesthesia and reflex therapy in the acute recovery period following antiorthostatic hypokinesia
N81-21749
- LESNYAK, A. T.**
Effects of space flights on lymphocyte blast transformation in cosmonauts' peripheral blood
N81-21741
- LEUTIN, V. P.**
Human memorizing of emotionally significant and neutral information during adaptation to different climato-geographic conditions
A81-29322
- LEVISON, W. B.**
A methodology for quantifying the effects of aging on perceptual-motor capability
A81-28675
- LEWIS, G. W.**
Multifunctional transducer
[NASA-CASE-NPO-14329-1] N81-20703
- LOF, M. E.**
Nuclear survivability/vulnerability of aircrews: An experimental approach
[AD-A095501] N81-20729
- LOBOVSKAYA, E. G.**
The role of ACTH and glucocorticoids in nonenzymatic fibrinolysis during immobilization stress in animals
[NASA-TM-76175] N81-20693
- LOZANO-PEREZ, T.**
Automatic planning of manipulator transfer movements
[AD-A096118] N81-21773
- LUFT, U. C.**
Specialized physiological studies in support of manned space flight
[NASA-CR-160936] N81-20707

- LVOV, V. M.**
The evaluation of the state of stress of an operator according to electrocardiogram statistical characteristics
A81-29318
- LYAPINA, L. A.**
The role of ACTH and glucocorticoids in nonenzymatic fibrinolysis during immobilization stress in animals
[NASA-TM-76175] N81-20693

M

- MACHADO, P. P.**
Experimental joint immobilization in guinea pigs. Effects on the knee joint
[NASA-TM-76067] N81-20696
- MACHINSKIY, G. V.**
Effect of level of motor activity on aerobic efficiency in healthy man
N81-21748
- MARCONDESDESOUZA, J. P.**
Experimental joint immobilization in guinea pigs. Effects on the knee joint
[NASA-TM-76067] N81-20696
- MARZARIAN, H. V.**
State of peripheral blood as related to altered diet and stress
N81-21746
- MARSHALL, W. K.**
Circadian variation in the latency of brainstem responses and its relation to body temperature
A81-30400
- MATSEV, E. I.**
The functional status of the human vestibular analyzer following 56 days in an aqueous immersion medium
[NASA-TM-75888] N81-20725
- MCKEE, S. P.**
A local mechanism for differential velocity detection
A81-28248
- MCLEOD, A. J.**
Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl
[LA-8572-MS] N81-20732
- MEERBAUM, S.**
Quantitative two dimensional echocardiography during bicycle exercise in normal subjects
A81-29274
- MELNIKOV, L. N.**
The design of cosmonaut living and working conditions
A81-27537
- MERKEE, B. H.**
Eye torsion and the apparent horizon under head tilt and visual field rotation
A81-28249
- MEERBAUM, S.**
Multifunctional transducer
[NASA-CASE-NPO-14329-1] N81-20703
- MICHAELSON, S. A.**
Biologic response to microwave/RF energy
[UR-3490-1832] N81-21734
- MIKHAILOV, V. A.**
Ground experiments for finding principles and working out methods for preventing adverse effects of weightlessness on the human organism
[NASA-TM-76465] N81-21760
- MIKHAYLOV, V. M.**
Activity of the right cardiac ventricle and metabolism in healthy persons during an orthostatic test after short term immobilization
[NASA-TM-76519] N81-20726
- MIKOS, K. N.**
Effect of specific volume on formation of atmosphere in sealed compartments
N81-21753
- MOORE, R.**
Constant pressure reservoir for organ perfusion
A81-30278
- MORI, M.**
Study on contraction and relaxation of experimentally denervated and immobilized muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724

- MOSHEIN, M. P.
The adjustment of the circadian rhythms of physiological functions during athletic training at various times of the day
A81-29321
- MULDIYAROV, P. I.
Ultrastructure of the myocardium of rats flown aboard the Cosmos-936 biosatellite
N81-21755
- MURADOV, I. S.
Effect of six-month hypokinesia in dogs on mineral component, reconstruction and mechanical properties of bone tissue
[NASA-TM-76168]
N81-20698
- MUTSCHLER, H.
Teamwork in target Acquisition
N81-20808

N

- NALIMOVA, T. A.
Study of human vestibular reactions to simulated periodic ship rolling
N81-21751
- NASON, J. R.
Lightside atmospheric revitalization system
[NASA-CR-160897]
N81-20731
- NEPEDOV, Y. G.
Effect of specific volume on formation of atmosphere in sealed compartments
N81-21753
- NEVES, D. M.
Knowledge compilation: Mechanisms for the automatization of cognitive skills
[AD-A096117]
N81-21767
- NEWMAN, B. L.
Pilot reaction to attitude gyro failure - A flight experiment
A81-29143
- NIKOLAEVA, E. I.
Human memorizing of emotionally significant and neutral information during adaptation to different climato-geographic conditions
A81-29322
- NINET, J.
Orthostatic hypotension
[NASA-TM-75889]
N81-20728
- NINZ, N.
Teamwork in target Acquisition
N81-20808
- NOSKOV, V. B.
State of cosmonauts' adrenohypophyseal system following orbital flights of different duration
N81-21740

P

- PAGE, N.
Proceedings of the Workshop on Subchronic Toxicity Testing
[ORNL/EIS-189]
N81-21763
- PATRICK, B. F.
Nuclear survivability/vulnerability of aircrews: An experimental approach
[AD-A095501]
N81-20729
- PAVLOVA, M. P.
Effect of six-month hypokinesia in dogs on mineral component, reconstruction and mechanical properties of bone tissue
[NASA-TM-76168]
N81-20698
- PAVLOVA, T. A.
The dynamics of psychophysiological and cardiovascular indicators during operator activity in the expectation and tracking regimes
A81-29317
- PETERSON, J. J.
Computational aspects of incorporating auxiliary information into an impact acceleration injury prediction model
[AD-A095299]
N81-20730
- PETROFSKY, J. S.
The influence of +Gz on semicircular canal function
A81-30277
- Constant pressure reservoir for organ perfusion
A81-30278
- Interactions between fatigue, muscle temperature, blood flow and the surface EMG
A81-30279

- PHILLIPS, C. A.
Interactions between fatigue, muscle temperature, blood flow and the surface EMG
A81-30279
- PODVIGIN, M. P.
Visual illusions arising during the perception of moving images
A81-27573
- POLESHCHUK, A. T.
Accelerations affecting man in stormy weather
N81-21750
- POPOVA, I. A.
Phosphatase activity of rat antibrachial bones after flight aboard the Cosmos-936 biosatellite
N81-21756
- POSHYI, V. S.
The adjustment of the circadian rhythms of physiological functions during athletic training at various times of the day
A81-29321
- PREACHE, M. M.
Design, construction and testing of a dc bioeffects test enclosure for small animals
[DOE/RA-10157/1]
N81-20702
- PUCHKOV, V. L.
Objective appraisal of tolerance to ventriculography with various radiocontrast media (according to electronystagmography data)
[NASA-TM-76340]
N81-20721

Q

- QUAM, D. L.
Pilot reaction to attitude gyro failure - A flight experiment
A81-29143

R

- RADKE, H.
Analysis of heart rate variability as an estimate of pilot workload in human engineering research
[ESA-TT-653]
N81-21764
- RADKEVICH, L. A.
Surgical access to separate branches of the cat vestibular nerve
[NASA-TM-76478]
N81-20715
- RAHE, A. J.
Nuclear survivability/vulnerability of aircrews: An experimental approach
[AD-A095501]
N81-20729
- RAZIN, S. I.
Functional-morphological parallels of the hypothalamo-pituitary-adrenal system response reaction to long-term hypokinesia
[NASA-TM-76001]
N81-20716
- REHIZOV, S. M.
Change in the biomechanical properties in the bone of rats as a result of a 19-day space flight in the Kosmos-936 satellite
A81-28116
- REPIN, A. A.
The coordination of eye and head movements during the gaze fixation reaction
A81-29316
- RIESEB, J. J.
The perception of verticality and the frame of reference of the visual tilt aftereffect
A81-28899
- RITLING, K.
The effect of immobilization and 3 (beta-aminoethyl)-1, 2, 4 triazol on the calcium content in gastric tissues of guinea pigs during the formation of experimental ulcers
[NASA-TM-75992]
N81-20691
- ROKHLENKO, K. D.
Ultrastructure of the myocardium of rats flown aboard the Cosmos-936 biosatellite
N81-21755
- ROKHOLENKO, K. D.
Effect of space flight factors on ultrastructure of skeletal muscles
N81-21754
- ROMANOV, V. V.
The evaluation of the state of stress of an operator according to electrocardiogram statistical characteristics
A81-29318

- ROMANOV, Y. M.
Changes in body mass of cosmonauts in the course
of a 140-day space flight
N81-21742
- ROSS, R. H.
Scientific rationale for the selection of toxicity
testing methods: Human health assessment
[ORNL/EIS-151] N81-21762
- ROZANOVA, V. D.
Change in energy expenditure and brain and adrenal
content of catecholamines in rats during
muscular loading and hypokinesia
[NASA-TM-76148] N81-20697
- RUMELHART, D. E.
Understanding understanding
[AD-A096290] N81-21765
- RUZHANTSEV, G. V.
Role of a decrease in body heat content in the
thermoregulatory reaction of the concha
auriculae vessels
[NASA-TM-76370] N81-20717
- RYCHKO, A. V.
Functional-morphological parallels of the
hypothalamo-pituitary-adrenal system response
reaction to long-term hypokinesia
[NASA-TM-76001] N81-20716
- RYOM, M. G.
Scientific rationale for the selection of toxicity
testing methods: Human health assessment
[ORNL/EIS-151] N81-21762
Proceedings of the Workshop on Subchronic Toxicity
Testing
[ORNL/EIS-189] N81-21763
- RYZHKOVA, V. I.
Effect of specific volume on formation of
atmosphere in sealed compartments
N81-21753
- S**
- SABAYEV, V. V.
Pharmacological agents for the prevention and
treatment of motion sickness
N81-21736
- SACHS, G.
Electrophoretic cell separation using microspheres
[NASA-CR-164168] N81-21730
- SAHA, S.
Development of a new noninvasive method to
determine the integrity of bone in vivo
[NASA-CR-160922] N81-20722
- SAPREZHINSKII, I. I.
Kinetic aspects of the chemical protection of
proteins against the effects of radiation
A81-28882
- SAPOVA, M. I.
The dynamics of psychophysiological and
cardiovascular indicators during operator
activity in the expectation and tracking regimes
A81-29317
- SAVIK, Z. P.
Effect of space flight factors on ultrastructure
of skeletal muscles
N81-21754
- SAVINA, V. P.
Effect of specific volume on formation of
atmosphere in sealed compartments
N81-21753
- SAVKIV, T. G.
Change in energy expenditure and brain and adrenal
content of catecholamines in rats during
muscular loading and hypokinesia
[NASA-TM-76148] N81-20697
- SAWENET, D.
Proceedings of the Workshop on Subchronic Toxicity
Testing
[ORNL/EIS-189] N81-21763
- SCHICK, F. V.
Analysis of heart rate variability as an estimate
of pilot workload in human engineering research
[ESA-TT-653] N81-21764
- SCHMITZ, E.
Control of a flexible robot arm
[NASA-CR-16416] N81-21772
- SCHUSTER, P.
The origin of genetic information
A81-28612
- SEID-GUSAYNOV, A. A.
Activity of the right cardiac ventricle and
metabolism in healthy persons during an
orthostatic test after short term immobilization
[NASA-TM-76519] N81-20726
- SELUYANOV, V. E.
Study of mass-inertia characteristics of human
body segments during 6-month hypokinesia by the
gamma scanning method
N81-21743
- SESSO, A.
Experimental joint immobilization in guinea pigs.
Effects on the knee joint
[NASA-TM-76067] N81-20696
- SHAEPFER, J.
Dual-mode microwave system to enhance early
detection of cancer
A81-28388
- SHALNEV, B. I.
Activity of the right cardiac ventricle and
metabolism in healthy persons during an
orthostatic test after short term immobilization
[NASA-TM-76519] N81-20726
- SHANNON, L.
Stress antagonizes morphine-induced analgesia in
rats
[NASA-TM-81282] N81-21732
- SHAPIRO, F. B.
The role of ACTH and glucocorticoids in
nonenzymatic fibrinolysis during immobilization
stress in animals
[NASA-TM-76175] N81-20693
- SHASHKOV, V. S.
Pharmacological agents for the prevention and
treatment of motion sickness
N81-21736
- SHELEPIN, I. U.
Visual illusions arising during the perception of
moving images
A81-27573
- SHIPOV, A. A.
Accelerations affecting man in stormy weather
N81-21750
Human color discrimination during vestibular
stimulation after exposure to bright light
N81-21752
- SHOROKHOV, I. I.
The evaluation of the state of stress of an
operator according to electrocardiogram
statistical characteristics
A81-29318
- SHOSTAK, V. I.
Characteristics of the functional mobility of the
visual analyzer
A81-29315
- SHULZHENKO, Y. B.
The functional status of the human vestibular
analyzer following 56 days in an aqueous
immersion medium
[NASA-TM-75888] N81-20725
- SIVOK, A. K.
Conformity with human requirements of protein
contained in the rations for crews of the
Salyut-6 orbital station
N81-21739
- SLEPCHUK, M. A.
Role of a decrease in body heat content in the
thermoregulatory reaction of the concha
auriculae vessels
[NASA-TM-76370] N81-20717
- SMIRNOV, I. I.
The evaluation of the state of stress of an
operator according to electrocardiogram
statistical characteristics
A81-29318
- SMIRNOV, K. V.
Efficacy of alimentary factors in the recovery
period following long-term antiorthostatic
hypokinesia
N81-21747
- SMITH, D. E.
Computational aspects of incorporating auxiliary
information into an impact acceleration injury
prediction model
[AD-A095299] N81-20730
- SMITH, S. L.
Requirements definition and design guidelines for
the man-machine interface
A81-30232

- SMOLKA, A.**
Electrophoretic cell separation using microspheres
[NASA-CR-164168] N81-21730
- SOLDATOV, I.**
Meniere's disease: A surgeon's tactics
[NASA-TM-76398] N81-20719
- SOMOV, V. I.**
Changes in body mass of cosmonauts in the course
of a 140-day space flight N81-21742
- SPIES, H. P.**
Pathogenesis of sudden death following water
immersion (immersion syndrome)
[NASA-TM-76542] N81-20723
- STAMMERS, R. B.**
Behavioural evaluations of simulators - Academic
and practical issues A81-27891
- STAZHADZE, L. L.**
Regional analgesia by conduction anesthesia and
reflex therapy in the acute recovery period
following antiorthostatic hypokinesia N81-21749
- STEPANIAN, E. B.**
Characteristics of the functional mobility of the
visual analyzer A81-29315
- STUPAKOV, G. P.**
Change in the biomechanical properties in the bone
of rats as a result of a 19-day space flight in
the Kosmos-936 satellite A81-28116
- Effect of six-month hypokinesia in dogs on mineral
component, reconstruction and mechanical
properties of bone tissue
[NASA-TM-76168] N81-20698
- Chemical composition of mineral component of human
vertebrae and calcaneus after hypokinesia N81-21744
- SYDIKOV, B. K.**
The role of thyroid hormones in thermoregulatory
reactions during altitude adaptation A81-27574
- SYRYKH, G. D.**
Results of studies of vestibular function and
spatial perception in the crews of the first and
second expeditions aboard Salyut-6 station N81-21737
- TAKAHORI, H.**
Study on contraction and relaxation of
experimentally denervated and immobilized
muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724
- TALAVRINOV, V. A.**
Changes in body mass of cosmonauts in the course
of a 140-day space flight N81-21742
- TARANENKO, Y. M.**
Effect of remaining briefly in orthostatic and
antiorthostatic positions on man's tracking
performance N81-21745
- TARASENKO, G. I.**
Permissible rates of barometric pressure changes
A81-27396
- TARASOV, I. K.**
Results of studies of vestibular function and
spatial perception in the crews of the first and
second expeditions aboard Salyut-6 station N81-21737
- TASHPULATOV, R. Y.**
Effects of space flights on lymphocyte blast
transformation in cosmonauts' peripheral blood
N81-21741
- TEZIKOV, E. B.**
Relic processes in the rat circulatory system
during long-term adaptation to hypoxia A81-27575
- TIGRANYAN, R. A.**
Activity of certain enzymes in subcellular
fractions of rat liver after flight on Cosmos
1129 biosatellite
[NASA-TM-76472] N81-20701
- Phosphatase activity of rat antebrachial bones
after flight aboard the Cosmos-936 biosatellite
N81-21756
- TISHLER, V. A.**
Study of mass-inertia characteristics of human
body segments during 6-month hypokinesia by the
gamma scanning method N81-21743
- Ground experiments for finding principles and
working out methods for preventing adverse
effects of weightlessness on the human organism
[NASA-TM-76465] N81-21760
- TITOV, A. A.**
Regional analgesia by conduction anesthesia and
reflex therapy in the acute recovery period
following antiorthostatic hypokinesia N81-21749
- TKACHENKO, Z. Y.**
Morphological changes in neurons of the hind limb
reflex arc during long term immobilization
[NASA-TM-75939] N81-20695
- TOLOKNOV, A. B.**
Relic processes in the rat circulatory system
during long-term adaptation to hypoxia A81-27575
- TROSHIKHIN, G. V.**
Effect of hyperbaric nitrogen and oxygen
atmosphere on activity of respiratory center
N81-21758
- TSIBULYAK, V. B.**
Regional analgesia by conduction anesthesia and
reflex therapy in the acute recovery period
following antiorthostatic hypokinesia N81-21749
- TSUJIHATA, H.**
Study on contraction and relaxation of
experimentally denervated and immobilized
muscles: Comparison with dystrophic muscles
[NASA-TM-76053] N81-20724
- TSVETOV, Y. P.**
Functional-morphological parallels of the
hypothalamo-pituitary-adrenal system response
reaction to long-term hypokinesia
[NASA-TM-76001] N81-20716
- UDALOV, D. IU.**
Preventing body mass elevation in aviators
A81-27397
- USHAKOV, A. S.**
Efficacy of alimentary factors in the recovery
period following long-term antiorthostatic
hypokinesia N81-21747
- UTKIN, V. M.**
Activity of the right cardiac ventricle and
metabolism in healthy persons during an
orthostatic test after short term immobilization
[NASA-TM-76519] N81-20726
- VABISHCHEVICH, A. V.**
Regional analgesia by conduction anesthesia and
reflex therapy in the acute recovery period
following antiorthostatic hypokinesia N81-21749
- VALERI, V.**
Experimental joint immobilization in guinea pigs.
Effects on the knee joint
[NASA-TM-76067] N81-20696
- VAVILOV, M. P.**
Preventing body mass elevation in aviators
A81-27397
- VERNIKOS, J.**
ACTH-like peptides increase pain sensitivity and
antagonize opiate analgesia
[NASA-TM-81254] N81-21731
- Stress antagonizes morphine-induced analgesia in
rats
[NASA-TM-81282] N81-21732
- VETROVA, Y. G.**
Activity of certain enzymes in subcellular
fractions of rat liver after flight on Cosmos
1129 biosatellite
[NASA-TM-76472] N81-20701
- VIL-VILIAMS, I. P.**
Comparative analysis of human tolerance to
prolonged loading at various gravitational
gradients A81-29319

VOLOZHIN, A. I.

Change in the biomechanical properties in the bone of rats as a result of a 19-day space flight in the Kosmos-936 satellite

A81-28116

Effect of six-month hypokinesia in dogs on mineral component, reconstruction and mechanical properties of bone tissue

[NASA-TM-76168] N81-20698

Chemical composition of mineral component of human vertebrae and calcaneus after hypokinesia

N81-21744

Chemical composition of mineral component of rabbit bones as related to 30-day hypokinesia

N81-21757

W

WEEKS, R. W., JR.

Permeation of protective garment material by liquid halogenated ethanes and a polychlorinated biphenyl

[LA-8572-MS] N81-20732

WEISS, B.

Behavior as a common focus of toxicology and nutrition

[UR-3490-1826] N81-21774

WINKLER-OSWATITSCH, R.

The origin of genetic information

A81-28612

WOLFE, J. M.

A binocular contribution to the production of optokinetic nystagmus in normal and stereoblind subjects

A81-28250

WYNNEEN, R. A.

Fractional capacity electrolyzer development for CO₂ and H₂O electrolysis

[NASA-CR-166149] N81-21770

Y

YAKOVLEVA, I. Y.

Results of studies of vestibular function and spatial perception in the crews of the first and second expeditions aboard Salyut-6 station

N81-21737

YEGOROV, A. D.

Results of vectorcardiographic examinations during and after long term space flights aboard the Salyut-6-Soyuz orbital complex

N81-21738

Changes in body mass of cosmonauts in the course of a 140-day space flight

N81-21742

YEVDOKIMOVA, I. A.

Changes in body mass of cosmonauts in the course of a 140-day space flight

N81-21742

Z

ZARGARYAN, B. M.

Importance of photoelectronystagmography for clinical study of the vestibular function

[NASA-TM-76404] N81-20713

ZASYPKIN, V. V.

Change in the biomechanical properties in the bone of rats as a result of a 19-day space flight in the Kosmos-936 satellite

A81-28116

ZATSIORSKIY, V. M.

Study of mass-inertia characteristics of human body segments during 6-month hypokinesia by the gamma scanning method

N81-21743

ZHUK, Y.

Islet in weightlessness: Biological experiments on board COSMOS 1129 satellite

[NASA-TM-76396] N81-20692

ZLATOBUMSKIYA, A. A.

Changes in body mass of cosmonauts in the course of a 140-day space flight

N81-21742

ZUBANOV, V. P.

The adjustment of the circadian rhythms of physiological functions during athletic training at various times of the day

A81-29321

ZWEHL, W.

Quantitative two dimensional echocardiography during bicycle exercise in normal subjects

A81-29274

ZYBIN, O. K.

Activity of the right cardiac ventricle and metabolism in healthy persons during an orthostatic test after short term immobilization [NASA-TM-76519] N81-20726

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